BACKLOG OF MAINTENANCE AND REPAIR (BMAR) AT PWC SAN DIEGO DEFINITION AND METHODOLOGY FOR REDUCTION

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THESIS

BACKLOG OF MAINTENANCE AND REPAIR (BMAR)
AT PWC SAN DIEGO
DEFINITION AND METHODOLOGY FOR REDUCTION

by

James Walter Owens II

Robert Larry Shultz

March 1979

Thesis Advisor: John Shiels

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For many years the Naval Shore Establishment has experienced funding shortfalls in the area of real property maintenance. As a result, the Backlog of Maintenance and Repair (BMAR) projects has increased at a steady rate with the total now approaching 550 million dollars. There was growing concern at the CNO and Congressional levels that maintenance deficiencies have significantly reduced the Navy's capability to meet its national defense mission.

The Chief of Naval Operations through his Director, Shore Facilities Programming Division, OP-44, recognized the seriousness of the problem and initiated several programs directed toward clearly and concisely defining the backlog and obtaining funds to (1) reduce the nondeferrable backlog to zero, and (2) to insure sufficient maintenance money is made available on an annual basis to prevent its recurrence. The "steady state" condition or no growth in backlog is directly related to the minimum annual cost of ownership of the Navy Shore Establishment.

This thesis explores the Public Works Center, San Diego BMAR in some detail addressing such areas as definition, generation, accuracy, and true magnitude. Once this concept has been fully developed, long range facilities maintenance planning, including potential fund sources and programs which could be utilized in reducing the BMAR to zero are explored. Lastly, the question of minimum cost of ownership is discussed with a viewpoint toward identifying a reasonable annual maintenance funding level which will prevent the growth of any BMAR.

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discussed with a viewpoint toward identifying a reasonable annual maintenance funding level which will prevent the growth of any BMAR.

TABLE OF CONTENTS

LIST OF DRAWINGS
CONTAINED IN APPENDIX M

TABLE OF ACRONYMS

AIS	Annual Inspection Summary
BEMAR	Backlog of Essential Maintenance and Repair
BMAR	Backlog of Maintenance and Repair
CNM	Chief of Naval Material
CNO	Chief of Naval Operations
CPV	Current Plant Value
DC	Deficiency Code
DOD	Department of Defense
EFD	Engineering Field Division
EPS	Engineered Performance Standards
FACSO	Facilities Systems Office
FY	Fiscal Year
IC	Investment Category
NFADB	Naval Facilities Assets Data Base
NAVFACENGCOM	Naval Facilities Engineering Command
NIF	Navy Industrial Fund
NMAR	Nondeferrable Maintenance and Repair
NAVCOMPT	Comptroller of the Navy
MILCON	Military Construction
MRP	Maintenance of Real Property
O&MN	Operations and Maintenance Navy
O&MNR	Operations and Maintenance Naval Reserve
OPNAV	Office of the Chief of Naval Operations
OSD	Office of the Secretary of Defense

POM	Program Objectives Memorandum
PRIME	Priority Management Effort
PWC	Public Works Center
RDT&E	Research, Development, Testing and Evaluation
RMS	Resource Management Systems
RPMA	Real Property Maintenance Activity
SECNAV	Secretary of the Navy
SFPB	Shore Facilities Planning Board
SFPS	Shore Facilities Planning System
WESTDIV	Western Division Naval Facilities Engineering Command

GLOSSARY OF TERMS

A-11 Budget: The annual budget containing planned work load, proforma balance sheet and income statement, computation of rates, and status of accrual projects, submitted by all NIF Activities via their chain of command to NAVCOMPT, DOD, and OMB.

Annual Inspection Summary (AIS): A facility condition report which lists the maintenance deficiences in existing buildings, structures, utility systems, and other facilities.

Backlog of Essential Maintenance and Repair (BEMAR): The backlog of essential maintenance and repair consists of those items of maintenance and repair as defined in DOD Directive 7040.2 over $10,000 which cannot be accomplished during the current fiscal year due to lack of resources. An item is considered essential when delay for inclusion in a future program will impair the military readiness and capability, or will cause significant deterioration of real property facilities.

"Cost of ownership": The minimum funding necessary to offset routine maintenance requirements of active facilities. Funding below this level results in consumption of plant assets and accumulation of nondeferrable maintenance backlog.

Current Plant Value (CPV): Today's cost to construct a facility that is physically equivalant (ie. same design, configuration, materials, building technology, etc.) to a facility in the inventory; the cost to replace <u>in kind</u> (ignoring wear-out).

Investment Category (IC): A grouping of similar facilities with related contributions to Navy missions such as aircraft operations, waterfront operations and utilities.

"Maintenance Floor": Established by Congress and is the amount allocated for maintenance, repair and alterations (functional categories M and R). Funds allocated for this purpose are "fenced", they may not be used for other purposes, although additional funding from within the activity may be applied to this purpose at the command's discretion.

NIF - Navy Industrial Fund: A revolving working capital fund. Navy Commercial or Industrial activities chartered under this concept do not receive appropriations for operating funds. Their operating costs are paid from the fund, and these costs are recovered by charging customers for services or products received and reimbursing the fund.

OP-44: Director, Shore Facilities Programming Division Office of the Chief of Naval Operations.

OP-92: Director, Financial Management Division, Office of the Chief of Naval Operations.

PRIME - Priority Management Effort: The name given to that portion of the resource management effort devoted to preparing for the implementing systems for the management of resources for operating activities. Initiated in FY 1968.

Public Works Center (PWC): A consolidation of activity Public Works Departments within a geographical area into a centralized organization to take advantage of economies of scale and eliminate duplications of management staffs and other personnel. The PWCs are Navy Industrial Fund (NIF) activities.

Real Property Maintenance Activity (RPMA): A Department of Defense term used to describe management and engineering functions involved in shore facility maintenance and operation.

RMS - Resource Management System: A series of systems designed to promote better management throughout the Department of Defense by providing managers with improved means of obtaining and controlling the resources required to accomplish their missions. Initiated in FY 1967.

Replacement Cost: The actual expenditure that would be necessary today to construct a facility that is functionally equivilant to the facility in the inventory (ie. with today's standards and criteria, today's building materials and technology, etc.)

Stabalized Rates: The concept of establishing rates at the time of the A-11 Budget submission (12 months or more prior to the start of the fiscal year) that will remain effective for the entire year. This concept was totally implemented by FY 1977. Prior to that time NIF activities adjusted rates monthly or quarterly with significant impact on customers budgets. After implementation, customers budgets were unaffected by cost fluctuations and NIF activities accrued the gains and losses and considered them when establishing the following year's rates.

I. INTRODUCTION

A. GENERAL

The Navy requirement for maintenance funds is based on the physical plant condition of facilities necessary to achieve basic Navy missions. Additionally, consideration is given to providing maintenance funds to prevent severe economic deterioration of facilities regardless of mission impact.

There are three components which compose the Navy's requirements for facilities maintenance. The first component addresses the routine "cost of ownership" which in general terms is the amount of funding necessary to offset the routine maintenance requirements of active facilities. This "cost of ownership" will exist regardless of past funding levels or current condition of the plant. The second component considers the marginal growth in the maintenance backlog which is the result of inflation and accelerated deterioration of an existing backlog. This aspect of backlog growth is difficult to measure, and has the potential for causing great impact on facilities condition. The third component considers the resources necessary to systematically reduce the nondeferrable component of the maintenance backlog to zero over a specified period of time.

The reported O&M, Navy nondeferrable maintenance and repair backlog was $486 million in Fiscal Year (FY) 1977. This

grew to $536 million in FY 1978 with a large percentage of the total in aviation and waterfront operation facilities, troop housing and messing and utilities. OP-44 directed 100% inspection of these specific facilities in FY 1978 which accounted for the somewhat unusual growth of the reported backlog.

Failure to fund the "minimum cost of ownership" over a prolonged period of time has caused the nondeferrable maintenance and repair backlog to reach such a magnitude that it is affecting the Navy's ability to perform its mission.

B. NIF MRP PROBLEM

The Director, Shore Facilities Programming Division (OP-44) during review of the Maintenance of Real Property (MRP) portion of the FY 1980 Navy Industrial Fund (NIF)[1] A-11[2] budget noted the significant magnitude of the backlog of nondeferrable maintenance and repair projects. In a memorandum to the Director, Fiscal Management Division (OP-92), OP-44 expressed concern that the Navy's NIF community was consuming its physical plant in the interest of maintaining as low a rate structure as possible (Appendix A).

Two alternative general solutions to the NIF backlog were discussed. The first proposal would be to directly

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[1]NIF: See Glossary of Terms for definition.

[2]A-11: See Glossary of Terms for definition.

fund the Chief of Naval Material (CNM) NIF activities with sufficient Operation and Maintenance, Navy (O&MN) resources to eliminate the backlog in a systematic manner over a reasonable length of time. A second method would be to establish a rate increase to customer activities of limited duration and use these funds to correct the backlog.

The Director, Fiscal Management Division (OP-92) responded to these proposals with a compromise. He proposed establishing a dual funds channel with partial O&MN infusion coupled with increased NIF stabalized rates to fund the remainder (APPENDIX B). OP-92 suggested the staffs join forces on the problems, confirm its appropriate magnitude and draw up a plan of action. Part of the OP-44 staff was physically located with the Naval Facilities Engineering Command (NAVFACENGCOM). Since a large percentage of the BMAR was identified at Public Works Centers (PWC) this area received considerable attention from both offices.

C. PURPOSE/METHODOLOGY

The Assistant Commander for Public Works Centers (Code 15) at the Naval Facilities Engineering Command (NAVFACENGCOM) was concerned about the significant growth in backlog of maintenance and repair (BMAR) projects at PWCs. This office sponsored this thesis, provided an initial description of the problem and assisted in providing much of the input data. The thesis addresses basic elements of BMAR in some

detail including actual procedures used in its generation and validation. This aspect is directly related to the magnitude question raised by OP-92. Secondly, the "minimum cost of ownership" was investigated, since this is related directly to the growth of BMAR.

Using PWC San Diego as surrogate for the entire PWC community, a methodology was investigated by the authors, in consonence with the intent of OP-44 and OP-92 guidance, to reduce BMAR to zero and maintain a steady state condition, or "minimum cost of ownership," which would prevent a recurrence in the uncontrolled growth of BMAR.

II. WHAT IS THE BACKLOG OF MAINTENANCE AND REPAIR (BMAR)?

A. PAST PROBLEMS WITH CREDIBILITY

The Naval Facilities Engineering Command (NAVFACENGCOM) utilized the Backlog of Maintenance and Repair (BMAR) as a facility condition indicator and as a basis for justifying requests to the Navy, Office of the Secretary of Defense (OSD) and the Congress for funds. [Ref. 1]

This facility's indicator was known as Backlog of Essential Maintenance and Repair (BEMAR) until the early 1970's. It was officially supposed to consist of those items of maintenance and repair over $10,000 as defined in Department of Defense Directive 7040.2 which could not be accomplished during the current fiscal year due to lack of resources. An item was considered essential when delay for inclusion in a future program would impair military readiness and capability, or would cause significant deterioration of real property facilities. [Ref. 2]

The accepted target figure for total BEMAR was one quarter of one percent of the Current Plant Value (CPV) of real property facilities supported by the Operations and Maintenance Navy (O&MN) Appropriation. Attempts to trace the source of this "accepted" BEMAR figure proved futile. However, its use in briefings, correspondence and instructions led to a general acceptance of that figure as the target. [Ref. 3] During the late 1960's and early 1970's

the BEMAR steadily grew to levels substantially above the one quarter of one percent figure, reaching $630 million in FY 1977 (Figure 1).

This rapid growth in BEMAR occurred without any apparent deleterious effect upon the operation of the Navy. If all of the items included in the BEMAR were truly "essential" to mission readiness as the definition implied, then how did it reach such proportions without its affects becoming apparent? This kind of question was being asked by Congress, OSD (Comptroller) and the Bureau of the Budget. The result was a gradual decline in the credibility associated with the BEMAR figure and its usefulness in funding justifications was diminished.

The strongest criticism was directed toward the term "essential" and how it was defined. Many felt there could be no such thing as an essential maintenance deficiency under the unilinear Navy concept. The Commanding Officer received a single expense operating budget and he could spend the money in any way he felt justified, except for the Congressionally directed maintenance floor. This meant he would have funded those maintenance deficiences which impaired his military readiness and capability. Stated in terms of a larger scale, the services would fund the essential items so there could be no such thing as BEMAR.

B. OP-44 TO PURIFY AND VALIDATE BMAR

The Chief of Naval Operations through his Real Property Maintenance Activity (RPMA) staff of OP-44 recognized the critical need to establish credibility in the concept of using the backlog of maintenance and repair as a true indicator of the condition of the shore establishment. Once the BEMAR could be substantiated, it would again become a useful tool in the justification of maintenance funding.

OP-44 approached the credibility and validation problem in two ways. First, the term "essential" was dropped from the designation and it became the Backlog of Maintenance and Repair (BMAR). This was a cosmetic change only, because "essentially" remained in the official BMAR definition as discussed in the next section. However, it removed much of the stigma attached to the term. The BMAR itself was purged of all items not requiring correction in the current year as of the FY 1977 Annual Inspection Summary (AIS) (Figure 1 & APPENDIX C). Second, in 1975 a management concept was introduced which required the maintenance of profiles for each facility investment category (IC). Each profile included an assesment of the condition of existing real property and an assessment of the significance of the military construction backlog. Based upon these assessments program objectives were developed to indicate to the Navy the CNO desires for long term trends. By relating real property needs to operational requirements, credibility

was built into the programming and budgeting process. CNO approved this management concept in August 1977 and it served as guidance in the formulation of the Navy's Program Objectives Memorandum (POM) 1980 [Ref. 4].

Dividing the maintenance of real property (MRP) into eighteen investment categories (IC) greatly facilitated identification of BMAR. Maintenance trend analysis could now be accomplished by specific category in addition to groupings by activity, major claimant or the Navy in total. It was also an excellent management tool which assisted the decision maker by enabling him to apply limited resources to specific IC's.

Unfortunately, attempts by OP-44 and NAVFACENGCOM to completely purify the definition of BMAR were not totally successful.

C. CURRENT (FY 1979) BMAR DEFINITION

The cornerstone of the maintenance and repair management system was the Annual Inspection Summary (AIS); discussed in some detail in Section IV. The AIS was also the basic source document for determining BMAR. CNO recognized subtle inconsistencies in the reporting requirements for AIS and issued a message clarification in March 1978 [Ref. 5]. This clarification introduced the term Nondeferrable Maintenance Repair (NMAR) and its definition, together with an implied definition for BMAR.

Each major claimant was required to prepare and submit two complete sets of AIS Summary Reports representing their total claimancy. One set summarized the total of all known reportable deficiencies as of 1 March 1978. The second set summarized the Nondeferrable Maintenance and Repair (NMAR) component of the AIS. Major Claimants were also required to prepare and submit narrative assessments of facility condition and narrative evaluations of mission impact of not correcting the deficiencies for each IC.

NMAR was defined as a subset of the total validated AIS deficiencies which, in the judgement of the activity Commanding Officers and major claimants, required corrective action during the current fiscal year. It was recognized that NMAR represented deficiencies at a point in time, 1 March 1978, and would include projects for which funding was planned during the period 2 March to 30 September 1978. Deficiencies requiring correction during the current fiscal year were subjectively derived but had to meet either or both of the following criteria:

(1) The deficiency is mission critical and deferral of corrective action beyond the current fiscal year will adversely impact readiness.

(2) The deficiency is expected to result in accelerated facility / equipment / material deterioration, and deferral of corrective action beyond the current fiscal year will have severe adverse economic impact [Ref. 5].

Also, though not specifically discussed in the message, those deficiencies covered by law or regulation which should be accomplished during the reporting period would also appear in the NMAR.

By deduction, when those projects listed on the NMAR were completed during the 2 March to 30 September period and then removed, the remainder should be BMAR. Conceptually, the document and decision flow corresponds to Figure 2.

Attempts to purify the BMAR in accordance with the two-part criteria were underway as early as 1977 and had received some visibility. This was evidenced by George Tomsho's NAVY PUBLIC WORKS MANAGEMENT STUDY completed during the summer of 1977 which noted that intensive study and work was underway to develop and compile an accurate and on-going backlog of maintenance and repair throughout the Navy shore establishment. The assessment included only that maintenance and repair essential to the operational readiness of the base or that which could have major long range economic consequences if not corrected [Ref. 6].

These modern definitions were quite similar to that which existed for BEMAR in 1966 as stated in part A of this section. The 1966 requirement that deficiencies be over $10,000 was the only major difference, and this limit was lowered to $1,000. Unfortunately, this was not the definition which was being used at the activity level.

Prior to recognition of the lack of credibility associated with BMAR, the official definition used in its generation was the end of fiscal year measurement of maintenance and repair work remaining as a firm requirement of the installation work plans that was not accomplished for lack of resources during that fiscal year [Ref. 1 & 7].

The Public Works Center (PWC) San Diego most closely followed the old definition in their generation of BMAR. By aggregating all deficiencies by structure the restriction of a minimum of $1,000 per item was usually exceeded and the AIS closely reflected all known reported deficiences. Specifics of the PWC San Diego AIS process are set forth in Section IV.

It was clear that each activity followed a unique procedure, based upon their own perception of the definition, to develop their summary. A uniform definition, understood by all personnel in the chain, needed to be promulgated by CNO through OP-44 or by NAVFACENGCOM to determine an accurate BMAR.

Once the basic definition of BMAR was clear, two other distinctions were required to develop a complete understanding of the subject. The appropriate subset had to be identified. There was really no such thing as a total Navy-wide BMAR. It was broken down into several categories which appeared on Report 2 of the Type A Annual Inspection Summary. The three major categories were Operation and

Maintenance (O&M), Navy Industrial Fund (NIF) and Research, Development Testing and Evaluation (RDT&E) activities. Most historical data on BMAR had been concerned only with O&M funded activities.

The second key distinction concerned maintenance and repair deficiencies reported on the AIS which were divided into six deficiency codes (DC). (DC definitions are provided in APPENDIX D.) Only DC 1 and 2 became BMAR and were shown on AIS Summary Report 1. Deficiencies to be corrected by complete replacement of a facility (DC 3 and 4) and demolition of facilities no longer required (DC 5 and 6) did not become part of BMAR. Accordingly, BMAR did not reflect the total nondeferrable deficiency backlog, but only that portion which was to be funded if at all, by the individual activity's operating funds (ie. the O&MN, NIF, or O&MNR appropriations).

Both of the above were awkward and potentially confusing methods of dividing and coding the Navy's maintenance and repair deficiencies and appear to be the result of attempting to conform to the existing appropriation structure. No single appropriation category funded the total facilities maintenance backlog problem and accordingly no indicator designed to justify a particular appropriation could be considered an adequate indicator of facilities condition.

At the time this thesis was written, the conditions described above had not been corrected.

III. HOW LARGE IS BMAR?

This section discusses the size of BMAR, and its trend in the late 60's and 70's as recorded at various levels within the Navy. The rationale for narrowing the scope of this thesis specifically to the BMAR at PWC San Diego is also discussed.

A. "NAVY WIDE" BMAR (O&MN)[3]

The reported BMAR at (O&MN) activities at the end of FY 1978 was 536 million dollars [Ref. 8]. This represented .98% of the current plant value (CPV) of O&MN supported activities. BMAR had been growing steadily as reflected in Figures 1 and 3. It is interesting to note in Figure 3 that after FY 1967, the rate of growth of BMAR increased appreciably. This coincided with the shift from a centralized "single executive" for real property management (NAVFACENGCOM) to decentralized resource managers (individual activity Commanding Officers) as a result of the implementation of Resource Management System (RMS)[4] in FY 1967

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[3]The BMAR at O&MN funded activities was often called "NAVY-WIDE" BMAR. This gave the false impression that it was the total BMAR for all Navy activities. In fact, it did not include BMAR for non O&MN funded activities (NIF, RDT&E, O&MNR, etc.). Their BMAR was reported separately, and had to be added together to arrive at a "Total" due to the fragmentation of the funding and appropriation process discussed in the previous section. Such a "Total" was not normally recorded.

[4]RMS: See Glossary of Terms for definition.

and project PRIME[5] in FY 1968. It is not the intent of this thesis to criticize RMS. It was pertinent, however, that the "minimum cost of ownership"[6] which exists regardless of past funding levels or current condition of plant must be met or a backing will grow with significant future economic and operational impact. Because this impact is often "not on my watch," RMS does not provide incentives for recognizing the "cost of ownership" as a current cost. Maintenance funding (M funds) have been less than the "cost of ownership" for many years. Any manager, decentralized or centralized, who recognized and wanted to meet the cost of ownership was still unable to apply funds above the level included in his budget. As a matter of operational necessity, funds initially budgeted for maintenance were often reallocated to urgent operational requirements. This practice led to the establishment of mandatory maintenance funding "floors"[7] by Congress.

The recognition of the cost of ownership at all levels of budgeting and execution, and providing funds to meet this cost, should be the basic objective of resource managers. Any efforts to reduce BMAR or prevent its growth in the future (the main focus of this thesis) cannot be effective

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[5]PRIME: See Glossary of Terms for definition.

[6]"Cost of ownership": See Glossary of Terms for definition.

[7]Maintenance "floors": See Glossary of Terms for definition.

unless this more basic objective is met.

The reduction in BMAR which occurred from FY 1977 to FY 1978, as shown in Figure 1, was caused by the redefinition of BMAR in FY 1977. This resulted in the purge of all deficiencies not requiring correction in the current year. Actual total deficiencies were not reduced. This purging was accomplished to conform with the rather restrictive DOD definition of BMAR and to increase the credibility of BMAR.

B. BMAR AT NAVY INDUSTRIAL FUND ACTIVITIES

NIF BMAR was $185 million /Ref. 8/ at the end of FY 1978; this represented 1.12% of the NIF CPV at that time.

1. History and Trends

The requirement to submit Annual Inspection summaries (AIS) and BMAR reports existed for some time, but due to differences in NIF accounting, funding, and budgeting methods, the reporting system had fallen into disuse at NIF activities. Reporting was reinstituted in FY 1977 when CNO concern over the condition of Naval shore facilities resulted in increased emphasis on Maintenance of Real Property (MRP) funding, inspection, and reporting systems. Accordingly, actual data on BMAR at NIF activities was available only for FY 1977 and FY 1978.

2. NIF Funding Differences

All of the funds for maintenance and the majority of the funds for the reduction of any backlog of maintenance

at a NIF activity came from its overhead budget or accrual program. Those funds were generated by the rates paid by its customers and not by O&MN appropriation. A NIF activity was therefore in the unique position of being able to establish its own maintenance budget (within the limits of certain external constraints, which are discussed in detail in later sections of this thesis).

Two other categories of fund sources for the reduction of BMAR were external to the NIF revolving fund and did not effect the rates paid by customers:

a. Military Construction (MILCON)

Both the regular MILCON program and the dedicated programs within it such as Shipyard Modernization, Energy Conservation Investment Program (ECIP), Pollution Abatement, Fast Payback, Cold Iron, etc., could result in reduction of BMAR by including replacement, repair, or alteration of facilities that had BMAR deficiencies. Minor construction costing between $75,000 and $400,000 was also funded from MILCON appropriations.

b. O&MN

Projects which may have reduced BMAR by replacing, repairing or altering a deficient facility at NIF activities could be funded by O&MN funds if they fell in one of the following categories [Ref. 9]

1. Maintenance or repair of unused facilities
2. Alterations to production facilities costing greater than $50,000

3. MINOR construction $0 to $75,000 (except alterations less than $50,000)

4. Restoration of facilities damaged by acts of God or catastrophies costing in excess of $50,000

3. Other NIF Differences

As stated in the previous section, a NIF activity had much greater control than an O&MN activity in determining its maintenance budget. Since it did not receive a direct O&MN appropriation for maintenance (M funds) it was not subject to any maintenance "floor" (or theoretically to any ceiling). Since NIF BMAR was not needed to support an O&MN budget, it was more a management tool, as a facilities condition indicator, then a budget tool. It was, however, used to support the A-11 accrual projects. Both of these processes were instrumental in establishing, in advance, a NIF activity's stabilized rates.[8]

The existance, at a NIF activity, of a large BMAR was not a function of low appropriations of O&MN M funds. Instead it was a result of limits imposed at NAVCOMPT, OMB and Congressional levels on the amount NIF rates charged to customers could increase from year to year, coupled with the pressures which existed for NIF managers to keep rates as low as possible. The result was the same predictable tendency to defer maintenance when faced with pressing

[8]Stabilized Rates: See Glossary of Terms for definition.

operational demands that existed at O&MN supported activities.

C. BMAR AT PUBLIC WORKS CENTERS

Public Works Centers are NIF activities and the general description in III-B above is applicable. The PWC BMAR was $58.2 million [Ref. 10] at the end of FY 1978, which was 2.01% of the PWC CPV at that time.

1. Why Focus on PWCs

In addition to the availability of sponsorship, there are several other reasons why it was appropriate to concentrate on BMAR at PWCs.

a. As shown in preceeding sections, PWC BMAR stated as a percentage of CPV was larger than that of NIF activities in general or of Navywide O&MN activities. All were significantly above the ¼ of one percent of CPV considered acceptable in the 1960's [Ref. 3].

b. PWC assets, though a small percentage of the Navy total, were utilized in providing maintenance and utility services to customers who represented 35% of the Navy's shore facilities assets.

c. PWC BMAR was growing larger and any program to reduce it would have significant impact on O&MN appropriations either through special appropriations or increased rates paid by O&MN customers.

D. BMAR AT PWC SAN DIEGO

PWC San Diego BMAR was $41.5 million [Ref. 11] as of 1 March 1978, which was 10.1% of their CPV. In addition to this unusually high percentage there were several other reasons why this thesis concentrated on BMAR at PWC San Diego:

1. PWC San Diego was the largest PWC in terms of volume of business (VOB). It had an FY 1978 VOB of $113 million [Ref. 12] which was more than $30 million greater than PWC Norfolk, the second largest PWC.

2. PWC San Diego is the second oldest PWC, having received its charter in 1963.

3. PWC San Diego BMAR constituted the major portion of BMAR for all PWCs in FY 1978 (See Figure 4).

4. PWC San Diego is reasonably close to the Naval Postgraduate school in Monterey, which facilitated TAD and telephone interviews.

E. PWC SAN DIEGO UTILITY'S BMAR

PWC San Diego utilities BMAR was $40.4 million [Ref. 11]. This is 97.3% of PWC San Diego BMAR (69.4% of ALL PWCs BMAR). A look at the BMAR of other PWCs revealed that the majority of BMAR at all PWCs was in utilities (95.2% of ALL PWCs BMAR was in utilities).

With the exception of a description of how BMAR is generated and a discussion of the validity of non-utility

BMAR in the next two sections, the remainder of this thesis was limited to discussion of PWC San Diego Utility BMAR and methods for its reduction.

IV. HOW IS BMAR GENERATED?

In research of existing instructions to define BMAR and how it is generated, many subtle inconsistencies and ambiguities were discovered.

Numerous phone interviews were conducted with staff at NAVFAC and OP-44 in an attempt to obtain clarification. It was found that the reporting system was not adequately described in available instructions. The following description of the BMAR generation process is the distillation of several directives and contacts with headquarters personnel. It represents the BMAR reporting process as originally envisioned.

A. THE PROCESS AS INTENDED

It was required that shore activities would conduct annual "Type A" inspections of facilities, and that all facility maintenance and repair deficiencies found and still in existance as of 1 March each year would be reported via the chain of command to CNO (OP-44). The total dificiencies were to be screened and separated into two categories, deferrable and nondeferrable. It was the major claimant's responsibility to provide the activity with guidance as to what should be considered nondeferrable. The major claimant's guidance was to be based on the following DOD criteria:

"Deficiencies which require correction during the current fiscal year are subjectively derived, and must meet either of the below listed criteria:

A. The deficiency is mission critical and deferral of corrective action beyond the current fiscal year will adversely impact readiness.
B. The deficiency is expected to result in accelerated facility / equipment / material deterioration, and deferral of corrective action beyond the current fiscal year will have severe adverse economic impact" /Ref. 5/

Once this nondeferrable maintenance and repair (NMAR) was determined, the major claimant was expected to remove projects which would be funded and accomplished during the remainder of the fiscal year (2 March to 30 September). The resultant list was BMAR.

All deficiencies reported on the AIS were also required to be assigned to one of six deficiency codes (DC).

Deficiency Code	Description
DC 1 & 2	Maintenance, Repair and Replacement in lieu of repair of less than the entire facility.
DC 3 & 4	Replacement of an entire facility in lieu of repair
DC 5 & 6	Demolition of an entire facility in lieu of repair.

DC 1, 3, and 5 are for projects below, and DC 2, 4, and 6 are for projects above, the activity's funding limitation. A detailed definition of deficiency codes is provided in APPENDIX D.

BMAR was used to indicate condition of facilities and to justify appropriation of Operation and Maintenance, Navy (O&MN) funds in subfunctional category M (Maintenance and

Repair). Only DC 1 and 2 deficiencies were appropriate for correction with M funds, hence BMAR consisted only of DC 1 and 2.[9] Deficiencies in DC 3 through 6, though part of a backlog, were not part of BMAR. Items in DC 4, though valid deficiencies, were not permitted to appear on the AIS listing of total deficiencies unless they were included in the five year Military Construction Program.

B. THE PROCESS AS DIRECTED

The basic concept and purpose of the AIS and BMAR reporting system was well described and accurately presented in the following quotation:

> "Justification for programming resources in the RPMA area is based largely on BMAR. BMAR is developed from the AIS which in turn is based on the activity inspection program. Without a comprehensive and current inspection program the content of AIS and the resulting BMAR is not valid. Since the facility maintenance of real property (MRP) function must compete for resources with weapons systems and other priority programs, the foundation for MRP program and budget requests must be sound and convincing, showing clear relationships to fleet readiness or significant economics. Even with such documentation the MRP program can reasonably be expected to be sub-optimized in order that overall Navy readiness may be optimized. When placed in this perspective, the following management concept for RPMA evolves:
>
> a. On a continuing basis, activities must perform thorough inspections of their facilities with emphasis on those areas which, in the commanding officer's opinion, are necessary to perform the stated activity

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[9]DC 3 is appropriate for correction with O&MN R (minor construction funds), DC 4 by Military Construction, Navy (MCN) funds and DC 5 & 6 by "other (&MN funds.

mission. Close attention must be focused on those items which affect the readiness of naval forces assigned.

b. In a similar fashion, major claimants must influence the activity inspection effort to emphasize areas which have the most serious impact on the claimant mission.

c. Although Naval Facilities Engineering Command Field Division (EFD) and public works center technical assistance may be utilized to identify deficiencies, the final decision on prioritization of deficiencies and assessment of condition is the responsibility of the activity commanding officer and ultimately the major claimant.

d. Once the inspection effort and the AIS have been completed, the major claimant has the responsibility of advising the CNO of the current BMAR and its effect on the ability to perform the assigned mission. BMAR requirements must withstand the scrutiny of intense review. These reviews in some cases may involve on-site inspections by OSD and other personnel.

e. Given a valid assessment of condition by the major claimants, CNO (OP-44) will support a total RPMA effort consistent with current and future requirements for support of the naval forces." [Ref. 1]

Though the basic concept was well described in instructions, the details of the intended generation process and content of BMAR were either not included, poorly described, or included only in instructions not distributed to field activities. A field activity did not need to know every detail or use of a reporting or budgeting process, but it must know all details which effect its input. If these details are not known, the input cannot be accurate, and the system cannot accurately perform its intended function.

In the interest of clarity, only those aspects of the intended process which are essential to valid input, but

which are not available to reporting activities, were covered in this section.

1. Screening for Nondeferrable Deficiencies

The DOD criteria that were intended to be applied to the AIS to determine BMAR were not available to reporting activities. Discussions with PWC San Diego managers revealed that few were aware of any distinction between total AIS deficiencies and BMAR. Those that were aware were unable to accurately cite the criteria by which nondeferrability must be determined. A search to find the criteria in writing revealed only three locations in which they appeared:

1) CNO MSG R241945Z Mar 78 [Ref. 5]
2) SECNAV Instruction 11014.11A [Ref. 13]
3) DOD Directive 4165.2 [Ref. 14]

None of these documents were found to be available at the field activities checked.[10]

2. Deficiency Codes

As previously stated, BMAR was intended to consist of deficiency codes 1 & 2 only. This fact was not readily

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[10] Item 1 is a message sent only to AIG Four Four (major claimants) Items 2 and 3 were not available at the following locations:

NAVPGSCOL Monterey	Admin Dept.
	Public Works Dept.
	Dudley Knox Library
PWC San Diego	Planning Office
WESTDIVNAVFACENGCOM	Maintenance Division

A copy of items 2 & 3 were finally obtained from NAVFACENGCOM

apparent from available instructions. The total on Summary Report #1 (APPENDIX E) and the <u>sub</u>total on Summary Report #2 (APPENDIX F) are totals only of deficiency codes 1 and 2. In official reports citing a specific number for BMAR, the number cited was always the subtotal of DC 1 & 2. This definition, based on usage, is the only documentation that could be found of this distinction which people at the OPNAV level treated as common knowledge. The significance of this distinction was that deficiency codes 3 through 6 were not part of BMAR and BMAR was not a true condition indicator. It was an indicator of deficiencies correctable by O&MN functional category M funds. There was no corresponding indicator of maintenance and repair deficiencies correctable by other O&MN funds or by Military Construction (MILCON) funds. Some MILCON correctable deficiencies were unprogrammed and the magnitude of those that were programmed was obscured by grouping them with alteration, expansion, relocation and other new facility requirements.

3. <u>Unprogrammed MILCON Projects</u>

By definition, replacement of an entire facility in lieu of repair is DC 3 or 4 and was funded by MILCON appropriations. MILCON projects, however, could be included in AIS or BMAR only if listed on the five year program for Military Construction [Ref. 1]. Accordingly, a deficiency of this type, though identified, could not be reported until it was programmed.

This thesis has focused on utilities deficiencies. MILCON funding of Utilities projects has historically been minimal and there is no indication that this climate will improve. Some utilities projects may never get programmed, hence theoretically may never be reportable under this system.[11]

It was possible to avoid this problem by phasing repairs so that an entire facility was not replaced. This allowed funding limitation to be observed, DC 1 and 2 to apply, and O&MN funds were appropriate. This approach, which is called incremenation and not permitted for structures, is permitted for utilities [Ref. 9]. It is not necessarily economical since the original justification for replacing a complete facility in lieu of repair should be that it is more economical than repairing or replacing a segment at a time. When a system is more responsive to an uneconomical approach then to an economical one, there are really only two choices: 1) work to change the system or 2) accept a less efficient allocation of resources as the only practical method of meeting operational commitments under an externally imposed system.

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[11]PWC San Diego reported 30.8 million of unprogrammed MILCON as FY 1979 BMAR (DC 2) wich was apparently removed by NAVFAC after discussion with CNM, the major claimant.

4. Screening for Funded Projects

Deficiencies which have not been corrected, but for which funds are available, and projects planned for the current fiscal year, must be removed from the AIS to arrive at an accurate BMAR.

The CNO's March 1978 message [Ref. 5] implied that this was a major claimant function. To be accurate, this screening for removal must be performed at both major claimant level and activity level in some coordinated fashion. A major claimant may not know what deficiencies an activity is planning on correcting within its level of funding approval and operating budget, and an activity cannot know what deficiencies can be corrected by additional funds redistributed by the major claimant. If a joint screening process was intended to OPNAV, it was not made clear in the instructions available to reporting activities.

5. Major Claimant Guidance

Based on numerous discussions with the OP-44 staff, it was determined that OPNAV's intention was for major claimants to play a major role in the BMAR reporting process. The OPNAV Instruction [Ref. 1] was being rewritten to clarify major claimant responsibility [Ref 8], OPNAV Instructions were apparently deliberately general in areas where it was intended that major claimants provide detailed and specific guidance. No written guidance from the Chief of Naval Material (CNM), the major claimant, or NAVFAC, the

subclaimant, could be found [Ref. 15]. Verbal guidance was apparently being provided by NAVFAC, and in amounts that increased during the writing of this thesis. It was not unlikely that some of the increase was due to questions asked by the authors during the research phase of this thesis.

C. THE PROCESS AT PWC SAN DIEGO

AIS: The inspection process was found to differ for utilities and for non-utilities. This resulted because many utilities deficiencies were not detectable by conventional inspection methods. Utilities deficiencies were identified as a result of engineering evaluation and the use of "state of the art" inspection equipment.[12] This process was too time consuming and costly to be performed annually on all utility assets. PWC San Diego had established a program of Utilities Systems Studies which is described in detail in APPENDIX G. These studies provided building blocks for a comprehensive master plan for efficient production, purchase, operation, maintenance, replacement / expansion, utilization and conservation of utilities and utilities systems. The programming of projects generated by this system was prudent utilities management,

[12] Equipment such as self-propelled TV cameras for inspecting buried pipe lines, infared cameras for detecting heat loss, etc.

however, all projects generated might not have fit within the rather rigid criteria for BMAR. It was the output of this program more than conventional inspection which provided input to the AIS. The reporting process as it was observed at PWC San Diego is shown in Figure 5. Several problems with this process were exactly as would be expected given the ambiguous or missing instructions and guidance.

1. <u>No Screening for Nondeferrable Deficiencies</u>

There was no screening for nondeferrable deficiencies. Every item on the AIS, with the exception of those marked for accomplishment by accrual, were designated as BMAR. In other words, of all the deficiencies identified at the center, none were considered deferrable.

2. <u>All Deficiency Codes in BMAR</u>

Every item on the AIS was either marked "A" for Accrual or "B" for BMAR. Items not in Deficiency Codes (DC) 1 or 2, which by definition cannot be BMAR, were marked with a "B". Though this error caused the activity to think its BMAR was larger than the true BMAR, the true total was available on both summary sheets as the total of DC 1 and 2.

3. <u>Unprogrammed MILCON Projects in BMAR</u>

Unprogrammed MILCON projects (at 30.8 million this was a significant portion of San Diego's 41.5 million reported BMAR) were reported as DC 2 and BMAR. They were

subsequently removed from BMAR by NAVFAC at the direction of CNM. The problem of how to give visibility to valid requirements which did not fit in the rigid definition of BMAR or the technical definition of AIS was not resolved.

4. No Screening for Funded Projects

Major Accrual projects were excluded from BMAR by marking them "A" instead of "B". Cost center managers, however, only removed minor projects actually accomplished, not those planned. Accordingly, all projects accomplished from 2 March to 30 September with a cost center's overhead budgets were not removed. Though small individually, in aggregate, this was potentially a significant discrepancy.

5. No Major Claimant Guidance

It would not be correct to say there was no guidance, however, there was none apparent in writing. Whatever the content of the verbal guidance, the discrepancies discovered indicate that it was either insufficient or ineffective.

V. HOW VALID IS THE PWC SAN DIEGO BMAR?

A. INVESTMENT CATEGORY MANAGEMENT

One of the first steps taken to restore credibility in BMAR as a facilities condition indicator was the implementation of investment category management. The concept first evolved in FY 1975 and was refined in subsequent years. An Investment Category (IC) was simply a grouping of similar facilities with related contributions to the Navy mission. For example, IC-01 summarized all air operational property such as runways, parking aprons, hangers and operational buildings; IC-03 summarized all waterfront facilities such as piers, keywalls and transit buildings. There were a total of 18 IC's in 1978, each of which represented a distinct operational area. A listing of all IC's used in 1978 is included in APPENDIX H.

The IC management concept required that each major claimant summarize the activity AIS by IC. CNO was provided a narrative assessment of the condition of real property and an impact statement of this condition on the ability to perform the assigned mission. Upon receipt of the summary AIS, narrative summary, and impact statement, the CNO analyzed the effect of real property condition on the total Navy mission. Using the IC listings from the major claimants, along with Current Plant Value (CPV), age of facilities, construction investments and past funding

levels and trends, a "profile" of key indicators was prepared for each IC Navywide. After analysis of the "profiles" the CNO met with claimants at the Shore Facilities Programming Board (SFPB) to discuss the relative importance of individual IC deficiencies. Ultimately the plan was published as a series of program objectives by IC's over the long term.

The summarization process at the major claimant level led to the identification of BMAR by IC.

B. PROBLEMS WITH DEFINITION

In January 1979, there were at least four official documents which contained definitions of BMAR. OPNAVINST 11010.23D, including Change Transmittal 2 of 10 July 1978, and OPNAVINST 11010.34 of 21 July 1977 both defined BMAR as follows:

> "The Backlog of Maintenance and Repaire is the end of fiscal year measurement of maintenance and repair work remaining as a firm requirement of the installation work plans prescribed by DOD Directive 4165.2...., but which lack of resources prohibit accomplishment in the fiscal year."

The Real Property Issue Paper for POM 1980 (FY 1980-1984) dated February 1978 did not clarify the definitional problem. Much of the thrust of that document was directed toward establishing credibility in the BMAR figure and insuring those items listed were truly essential. The paper stated, "The resultant Navy AIS can fairly safely be assumed to be in strict accordance with a rather restrictive

DOD definition of BMAR." However, in Tab A, Definition of Terms, the Backlog of Maintenance and Repair was defined almost identically to that in the OPNAV Instructions. It read as follows:

> "The end of the fiscal year measurement of maintenance and repair remaining as a firm requirement of the installation work plans but which lack of resources prohibit accomplishment in the fiscal year. In this sense, accomplishment implies obligation."

The definition says "firm requirement" and carries with it no restrictive essentiality criteria.

CNO message 241945Z Mar 1978 implied projects listed on the AIS must meet the following criteria to be considered BMAR:

(1) The deficiency is mission critical and deferral of corrective action beyond the current fiscal year will adversely impact readiness.

(2) The deficiency is expected to result in accelerated facility / equipment / material deterioration, and deferral of corrective action beyond the current fiscal year will have severe adverse economic impact.

Interviews with personnel at OP-44 and NAVFACENGCOM Code 15 clearly indicated this strengthening of the BMAR definition by CNO was intended to clarify subtle ambiguties in the definition and reinstate credibility in the reported figures. Only those items which were clearly essential were to be reported and BMAR had to be able to withstand the test of close scrutiny. Personnel from both organizations when visiting field activities made a point of reiterating the definition promulgated in March 1978.

However, the meaning of BMAR was still being interpreted differently at each activity. It was even found that the definition being used differed significantly within the PWC San Diego organization. The Planning Officer was aware of some set of new criteria which mustbe met prior to an item being considered BMAR, but he could site no official reference containing the definition. He also recognized the difficulty in identifying a uniform BMAR concept throughout the organization.

The Planning Officer further indicated the PWC San Diego AIS was annotated "A" for accrual projects and "B" for BMAR projects prior to submission to NAVFAC, and that the Western Division, Naval Facilities Engineering Command (WESTDIV) conducted spot checks of the AIS projects for essentiality. The "A" and "B" notation system was locally generated in the absence of other firm guidance. All line items on the AIS are either "A" or "B".

The Supervisor of the Inspection Branch with responsibility for conducting facility inspections which resulted in the AIS had his own definition of BMAR which more closely resembled the "old" one set forth in the NAVFAC instructions. This was the level in the organization at which BMAR was actually identified and entered in the AIS. In reality BMAR was any line item over $1000 which had not been identified by a responsible Cost Center Manager as having already been accomplished, or would be accomplished by accrual

through the rates. There was no screening of individual work segments within the $1000 aggregation and no upper level management screening for essentially other than that which was done by the Cost Center Managers. Restated, any facility maintenance totaling over $1000 in the aggregate which was not scheduled to be done during the current fiscal year would be reported as BMAR.

Review of a random sampling of Inspector's Reports used in compiling the 1 March 1978 AIS showed many identified deficiencies which were not essential or nondeferrable. Yet these same deficiencies were included in the AIS line items annotated "B" for BMAR.

The Inspection Branch Supervision pointed out that the AIS is sent directly to NAVFAC with a copy to WESTDIV and that WESTDIV provides no screening or spot checks for essentiality.

The Maintenance Assistant to the Cost Center Manager of the Maintenance Department was contacted to determine how BMAR was defined at this level in the organization. It was found that only the AIS document had any significance. The backlog for each specific cost center was the only area of concern and it was managed through the subjective judgement of the Cost Center Manager by deciding what work to do during the current year. Anything that was left over would be an accrual project or BMAR.

It was obvious that more effort was needed Navy-wide to provide facilities' managers with a concise definition of BMAR, one which would provide a clear understanding of the CNO's intent. Emphasis was needed to insure that managers made the information known to all personnel associated with the generation and validation of BMAR. The activities had not been uniformly made aware of, or forced to recognize the distinction between deferrable and nondeferrable deficiencies. Until this was accomplished, the credibility of the BMAR figures could be suspect.

As a minimum OPNAVINST 11010.23D and OPNAVINST 11010.34 needed to be changed immediately to reflect the new BMAR definition. NAVFAC needed to issue supplemental written guidance to the PWC's clearly outlining the procedures to be followed in screening the AIS for deferrable and non-deferrable deficiencies. Guidance similar to that issued by the Chief of Naval Education and Training (CNET) was needed (APPENDIX I).

C. PROBLEMS WITH THE AIS

OP-44 and NAVFACENGCOM recognized that the cornerstone of the maintenance and repair management system was the Annual Inspection Summary (AIS). It needed to come from effective, thorough and timely inspection by individual activities. This was potentially the weakest element in the BMAR identification process.

NAVFACENGCOM Code 15 initiated a concentrated program to develop a computer assisted Facilities Inspection System (FIS) designed to improve the management of the inspection program. San Diego was used as a pilot location for implementation and evaluation. Once proven, the system would be made available to all Navy facilities managers.

The new FIS was designed to provide the following benefits:

(1) Standardization of PWC method of managing the Facility Inspection Program.

(2) A systematic approach to scheduling facilities inspection.

(3) Identification of manpower requirements for each programmed inspection cycle.

(4) Accurate facilities deficiency and inventory information.

(5) Timely and reliable Type A AIS reports.

Utilization of sophisticated Electronic Data Processing (EDP) hardware or software for the FIS was deliberately avoided to prevent problems with systems compatability which could restrict its usefulness. Data updates and information between the Facilities Systems Office (FACSO) and activities would probably be accomplished by mail, using floppy disks as the transfer media. This approach assured even relatively small Public Works Departments with access to only limited EDP facilities would be able to utilize the FIS.

The biggest problem encountered in developing the FIS concerned the existing available data base. The Naval Facility Assets (NFA) data base maintained by the Facilities Systems Office (FASCO) in Port Hueneme, California, was not reliable and had to be manually validated. This was a problem of tremendous proportions since it contained all assets carried in the NFA and manual validation would be necessary at every activity implementing the FIS. There were also contradictions between the NFA data base and the CNM automated AIS systems in size and content of certain data elements which had to be resolved.

The FIS concept was very sound the promised to be an excellent management tool for use in the allocation of resources to the inspection program. The FIS effort also coincided with OP-44's emphasis on identifying deficiencies by IC and success in programming additional funds to provide for 100% inspection of facilites.

D. PROBLEMS WITH INSPECTION

The essential element of the AIS, the FIS, the BMAR and the entire IC management concept is <u>inspection</u>. As previously discussed, the new definition of BMAR did not reach the lower levels of the PWC organization where AIS and BMAR were generated. Taking this into account, other elements affecting BMAR validity increased in importance and were researched within PWC San Diego.

1. Personnel Considerations

The basic organization of Public Works Centers was restructured in 1977. The philosophy behind the restructuring and the actual details of the new organization are not addressed in this thesis. However, it is important to note the new organization separated the Inspection and Planning and Estimating (P & E) Branches. Inspection is under the Planning Office and P & E is under the Production Office within the Service Department. The new Organization Chart is shown in APPENDIX J. This created internal personnel conflicts at PWC San Diego. P & E personnel were assigned higher grade levels and had broader advancement paths than did Inspectors. Personnel in the Inspection area considered it to be a "dead end" position. At the same time, the Inspectors felt that they were doing P & E type work since they prepared field estimates at the time the inspections were done. The field estimate did not have the detail of a full cost estimate made up by P & E personnel when a project was costed. It was used, however, to quote customer activities an initial price for planning purposes, and this caused the internal friction.

The Inspection Branch was understaffed at PWC San Diego and without outside assistance could not inspect all the facilities for which it had responsibility in accordance with the schedule set forth in the Inspection of Shore Facilities, NAVFAC MO-322. This condition was made worse each

time a new activity came under the PWC umbreallla as occurred when NAS North Island was absorbed without augmenting PWC Inspection assets. To correct the shortage, personnel were detailed from the production shops on a temporary basis to work as inspectors. Personnel did not normally volunteer to leave the shops even for short periods. Advancement/ promotion paths were clearly defined in writing or informallly established by tradition and absence from a shop for any duration could result in loss of advancement opportunity.

The individuals detailed as inspectors received no formal training and had little or no experience. They presented some serious attitude and motivational problems when placed in undesirable positions (from their perspective) which inherently received little direct supervision.

2. Level of Inspection

There was a direct relationship between BMAR and level of inspection. Level of inspection is not particularly concerned with how often facilities are inspected, since this is stipulated in the MO-322, but how thoroughly they are inspected. Inspections can range from a cursory drive past a building in a vehicle to conducting a detailed structural analysis. There is a cost/benefit break even point somewhere between these extremes where deficiencies discovered become less significant than the cost of inspection itself. This is a very complex subject which could

result in a thesis research program in itself and will not be addressed in detail herein. However, the more thoroughly a facility was inspected the larger would be the BMAR figure, and that aspect is important to this thesis.

A review of a random sample of Inspector's reports from PWC San Diego and discussions with personnel involved in the program indicated circumstances forced the inspections to be superficial in nature. The most obvious discrepancies were receiving the greatest attention.

As noted previously, a field estimate was prepared at the time a facility was inspected. This figure was based entirely upon the degree knowledge and experience of the inspecting individual. Only when the project had been approved for accomplishment was a detailed cost figure obtained from the Planning and Estimating Branch. The rough field estimate was used in both AIS and BMAR reporting. No statistical analysis had been done to determine how closely the initial field estimate approximated theP & E estimate or the actual cost of project accomplishment. There was a "feeling" at PWC San Diego that the estimates were pretty good.

Inspection scheduling techniques, which the NAVFAC FIS was designed to improve, left considerable room for unintentional error. The MO-322 provided basic guidance on how often to inspect, but said nothing as to when the inspections are conducted. Vagaries of the day-to-day

Inspection Branch operations resulted in an erratic schedule. When the inspection schedule slipped to 13 months or more, some sort of indexing of the old figures was utilized for the next AIS submission vice actual inspection.

Review of the 1 March 1978 AIS substantiated this practice. Col. 14, Date Last Inspected, and Col. 15, Date Deficiency First Reported, were identical for most line items. Some dates were as old as June 1976. Perhaps most importantly, Col. 18, Date of Last Estimate of Cost, showed many cost estimates updated to January 1978 while the inspection dates remained unchanged. This implied some factor was used to escalate the original field estimate but no actual reinspection was conducted. Considerable facility deterioration could have occurred which would be undetected and not reflected in the AIS and BMAR figures.

3. New Inspection Programs

OP-44 recognized early in 1977 that effective, thorough and timely inspection and reporting was the heart of the facilities management effort. Two programs were implemented to improve this area. First was the identification of additional funding resources to provide for full inspection of all facilities maintained by NAVFAC PWC's. This was a three-phased program which identified IC-01 Aviation Operation Facilities, IC-03 Waterfront Operational Facilities and IC-17 Utilities for full inspection in FY 1978, four additional IC's in FY 1979 and the remaining eleven IC's in

FY 1980. Additional funds in the amount of $1.7 million in FY 1979 and $1.9 million in FY 1980 were programmed for increased effort.

The second program evolved from the recognition that deficiencies in major utility systems, piers, runways, and POL storage facilities cannot be identified by conventional inspection techniques until deterioration has reached catastrophic proportions. To eliminate costly consequences of delays in identification of deficiencies new inspection techniques and equipment were being developed by the Navy Civil Engineering Laboratory in Port Hueneme, California. Information on this program had not reached the PWC's by December 1978.

Even though OP-44 obtained additional funds for a full inspection program, PWC San Diego did not have sufficient civilian ceiling points in the Inspection Branch to hire more personnel to perform the work. Personnel at NAVFAC and OP-44 indicated much of this inspection effort would be contracted out to civilian firms. However, PWC San Diego planned to detail personnel from production shops to fill in the inspection ranks. The shops would then hire more readily available skilled personnel on a temporary employment basis. This procedure would result in lower quality inspections and field estimates than would be obtained from contracting the inspection out to a civilian firm specializing in this type work.

E. PROBLEMS WITH SCREENING FOR BMAR

In order to maintain credibility in the BMAR figure a rational, uniformly applied, screening process had to occur to separate the AIS into deferrable and nondeferrable deficiencies. Only those items which could not be deferred because of operational needs or economic impact beyond the current fiscal year should be identified for listing on the BMAR. The screening technique was intended to force the lowest responsible level of management to recognize the relative importance of various deficiencies, thus ensuring mission related deficiencies received the highest priority. [Ref. 4]

PWC San Diego had a Facilities Review Board whose members included the Executive Officer, Production Officer, Planning Officers and Comptroller. The Board had responsibility for establishing priorities for accomplishment of nondeferrable deficiencies. To some degree, they also attempted to identify alternate fund sources to pay for specific categories of projects. Alternate sources included Military Construction (MILCON), minor construction, major claimant special project funds, Other Procurement, Navy (OPN), dedicated MILCON such as Pollution Abatement, Cold Iron, etc.

In actuality, nearly all of the screening occurred much lower in the organizational structure. Once the AIS had been compiled in the "smooth rough" by the Inspection Branch,

copies were sent to all Cost Center Managers where those projects which had already been done were lined out. Using his subjective judgement, the Cost Center Manager then determined what work would be accomplished during the remainder of the current fiscal year. This was subject only to the constraint that total cost of work done throughout the year coincided with anticipated overhead funds indicated on previously approved annual budget. The marked-up copies of the AIS were returned to the Inspection Branch for consolidation and smooth typing. All items not lined out, including work Cost Center Managers plan to accomplish, were then designated "A" for accrual and "B" for BMAR. The Planning Officer normally signed out the smooth AIS "By direction."

This procedure did place the decision making at the lowest responsible level of management in the PWC organization, but lack of definitive guidance to these managers and confusion about the definition of BMAR had all but eliminated the intended screening process and conformance with the desired criteria. This procedure also prevented activity-wide screening since each Cost Center Manager reviewed the AIS independently. It resulted in deferrable work being done in one cost center while another cost center would accomplish only a small portion of identified critical nondeferrable projects.

The lowest level of management which screened the AIS should have functioned with total knowledge of the current

AIS/BMAR philosophy and Command policy. These managers should not be permitted to screen independently. Some coordinating body, most appropriately the Facilities Review Board, had to ensure that overall PWC goals and objectives were met and that the limited resources were applied to the most critical deficiencies.

All activity major claimants were tasked with performing a screening and validation function. For PWC San Diego, NAVFAC as sub-major claimant performed initial screening for the Chief of Naval Material (CNM), the Major Claimant. Screening was done on the aggregated IC level. This insured that emphasis was properly placed on the desired operational areas, but unfortunately essential details were lost. Combining all deficiencies by structure to obtain the $1000 minimum necessary to be included on the AIS masked the nature of the individual deficiency. Further, it was impossible to expect the major claimant reviewer to have sufficient detailed knowledge of each activity to know which structure elements within the IC were mission essential and which were not. The result was correct identification of critical investment category, but concurrent approval of nonessential deferrable work within the IC.

It was incumbant upon the PWC to conduct accurate screening/validation in accordance with current criteria prior to submission to the major claimant.

F. PROBLEMS WITH BMAR ACCURACY

There are several additional factors which effected the accuracy of the BMAR figure and are worthy of note. These were more procedural in nature than the previously discussed personnel problems associated with identification and validation.

1. Financial Controls

The Cost Center Manager "negotiated" his budget with the Comptroller and the Budget Review Committee. The actual mechanics of the budget formulation process are not germane to this topic and are not addressed in detail. It is important to know only that the cost center labor rates included an overhead amount intended to fund maintenance of PWC production facilities. The work funded through the overhead portion of the production rates is termed "minor maintenance". Once the Cost Center Manager had an approved budget, including estimated minor maintenance funds, he was able to identify specific projects on the AIS which he wanted to accomplish that fiscal year.

Review of the PWC San Diego Financial and Operating (F & O) Statement for 30 September 1978 indicated minimal controls were placed on the actual spending in overhead areas which effect BMAR. Detailed Cost Center Statements for 500-Maintenance, 620-Utilities Operation, 690-Utilities Communications and the Cost Center Summary are included in APPENDIX K for illustration purposes. Maintenance and

repair to buildings and maintenance and repair to grounds are categories of overhead spending which have a direct impact on BMAR.

The F & O Statement showed all variances as the percent of budgeted costs to actual costs. In the facilities maintenance area, where the intent should have been to spend at least what was budgeted, this had a tendency to distort the true picture. Some specific examples of maintenance and repair to buildings were as follows:

Cost Center	Actual Cost	Budgeted Cost	% Variance
500	$99,370.42	$212,081.00	53
620	$ 1,995.60	$ 63,862.00	97
690	$ 735.87	$ 32,546.00	98
Summary	$199,876.50	$479,569.00	58

The variance would have more impact if the figures were reversed and stated in terms of actual cost divided by budgeted cost. The PWC in total spent 42% of the amount budgeted for maintenance and repair.

The variances were caused by many factors; the most important two were Cost Center Manager discretion to spend as desired and PWC-wide dedicated programs which tapped maintenance funds. These dedicated programs are discussed in Section VI. The variance for PWC San Diego in the total budget was only - 4%, which meant the Center actually spent more than was budgeted, or incurred an operating loss. Since the small total variance implied the Center came close to

budget, the conclusion could be drawn that maintenance spending was discretionary. The Cost Center Manager must have some latitude within the budget, but in the critical area of facilities maintenance there should have been clear guidance to prevent excessive diversion of funds.

PWC San Diego had initiated a Shop Improvement Program (SIP) to consolidate and improve production facilities. This will be discussed in more detail in a later section. It is noted here as an example of a PWC dedicated program which diverted some of the maintenance funds.

The AIS and ultimately the BMAR were reduced by the projects the Cost Center Managers accomplished during the fiscal year. Diverting funds results in maintenance work not done and the BMAR growing larger than planned. This understatement will not be corrected until the facility is reinspected and reported on the AIS.

2. Duplication of Effort

There was a tremendous amount of uncoordinated inspection of facilities taking place in the Naval Shore Establishment. Many of the unrelated inspection programs had some impact on the accuracy of the reported BMAR figure. There was considerable duplication of effort which represented an inefficient use of limited resources. Some of this effort should have been expended to improve the NFA data base problems discussed in Section V-C.

There were three routine inspections conducted on a regular basis for separate purposes. These were the facilities maintenance inspections performed in accordance with the MO-322 and OPNAVINST 11010.34 which resulted in the AIS; the Engineering Evaluation (EE) of existing assets performed in accordance with the Navy Facilities Assets (NFA) Data Base Manual, NAVFAC P-78; and the real property inventory required by the NAVCOMP Manual.

In addition, there were one time directed programs intended to highlight specific areas which required somewhat unique or specialized inspections. These most often were generated by public interest on a national level. Examples included inspections to insure facilities met seismic design standards for earthquake protection, inspections for energy conservation in both consumption and radiation, and safety inspections to comply with new regulations such as the Occupational Safety and Health Act (OSHA).

It was the specific inspections which resulted in errors in the reported BMAR. For example, the activity inspector could conduct a routine inspection one month and find no significant deficiencies, the next month a thorough seismic or safety inspection could be done which would reveal numerous non-deferrable deficiencies. Considerable time elapsed before this latter information was known to anyone who had the knowledge or authority to include it in a BMAR listing.

Each inspection was performed under a different schedule by different people and with no apparent attempt at joint utilization of limited resources or cross-checking of information. Central coordination of the inspection programs would have resulted in better utilization of personnel. A thorough review of what each inspection was intended to accomplish would have also provided a listing of common data elements for multiple checks of the FASCO NFA data base.

3. <u>Deficiencies Not Shown on BMAR</u>

The most significant errors in the PWC San Diego reported BMAR were in programmed and unprogrammed MILCON projects. Once an uncorrected facility deficiency project was assigned a MILCON "P number" and had been included in the 5 year MILCON program, it was considered programmed and was supposed to be reported separately in the AIS /Ref. 1/. PWC San Diego recognized programmed projects, but continued to report them as BMAR. Reference 1 also excluded reporting of any unprogrammed MILCON projects. PWC San Diego reported these projects as BMAR in the AIS.

Historically, programmed utility projects had a very poor chance of being funded by Congress. Additionally, non-deferrable unprogrammed projects were excluded from any reporting mechanism. This situation resulted in severely deteriorated mission essential utility systems, which required large sums of maintenance money and labor effort to maintain, never being included in a BMAR figure.

4. Economic Reality Distorts BMAR

The U.S. Government did not practice "life cycle" costing for its facilities nor did it depreciate its assets. The PWC F & O Statement did provide a depreciation figure but this was for record purposes only. The MILCON appropriation system used in 1978 provided no rational means of replacing a facility when it had reached the end of its economic or useful life. Such a system would have destroyed any private enterprise, which must plan its facility requirements well in advance of need. Since this was not done in the Navy, this meant facilities had to be maintained as though they would be kept forever. This forced the facilities manager to make decisions about maintenance which he knows are uneconomical. Life cycle costing was required by Reference 13.

The PWC, for both its own facilities and those of its customer activities, routinely expended maintenance funds on facilities which had long passed their economic lives and should have been replaced. BMAR would have been lower if facilities had been replaced as detailed by sound economics.

In the total life of the average Navy facility, the excessive maintenance funds spent after a structure passed its economic life would probably have totaled more than its replacement cost. This would be an interesting area for further research study. One approach could be to use Public

Utility standards for facility replacement, apply this to PWC systems, then total annual maintenance costs accrued subsequent to the "normal" replacement date.

G. TWC SAN DIEGO UTILITY SYSTEM BMAR

The Utilities Department, Cost Center 600, at PWC San Diego had 97.35% of the identified BMAR for that activity in 1978. This did not include a significant number of programmed utility MILCON projects. The utilities backlog at San Diego was the largest of any reported by the other seven PWC's. Its magnitude appeared to be the result of the facilities management philosophy employed and the approach used in identification of deficiencies.

1. Utility Maintenance Philosophy

The Utilities personnel knew there was a significant problem with maintenance of the systems. Almost continuous repair problems could have conceivably kept the planning effort at the breakdown maintenance level with all work going into the day to day operations. However, there was a concentrated management effort to avoid this and develop a sound master plan in 1977 for all San Diego area PWC utilities. This effort involved four basic steps:

(1) Determine what the systems actually are and where they are located.

(2) Determine the condition of the existing utility systems.

(3) Identify the expected remaining useful life of the systems.

(4) Develop a long range master plan for repair and replacement based on current conditions and anticipated future requirements.

Steps 1, 2, and 3 were relatively complete, within available resources, and the master plan was being developed in 1978. Any projects associated with the utility systems, including inspections, MILCON, and accrual projects were develped in consanance with the master plan philosophy, but were not kept in strict accordance with the BMAR criteria of nondeferrability.

There was a fifth step which lacked clear definition but could have been called midrange planning. This concerned the funding sources more than project planning or preparation. There was a conscious attempt to ascertain the most likely and quickest funding source for each project and pursue that even if it was not the most appropriate. For example, a project would be submitted for accomplishment using accrual funds, even though it could be done using the MILCON route, since obtaining accrual funds was easier and more assured. Some projects, lacking a high priority in the master plan, would be submitted for MILCON funding when accruals would also be appropriate, because the method would save customer activity O&MN funds.

Another sound managment approach taken for correction of utilities systems deficiencies was to load as much utility improvement work as possible into a MILCON project. It was a rational approach to plan for any new facility to

carry its total utility requirements, including all repair and replacement work outside the immediate project boundary but necessary to insure a reliable source. A strong argument was also made for sizing utilities in one project to meet known future requirements.

All required maintenance work was also done in consonence with the master plan concept. Systems were upgraded whenever possible to increase capacity in anticipation of increased demand or to meet changes in technology. Changes in type and quantity of electricity, steam, air and water for new classes of ships being developed were a mandatory consideration in the planning process where replacement work was necessary.

Both MILCON programs and maintenance work placed strong emphasis on system integrity and reliability. Electrical grids and steam, water and air system loops were closed whenever possible. This would permit backfeeding of utility services and eliminate what otherwise could have been major outages. Work in this area was sensitive since it often involved new installations which could neither be considered repair or part of a new facility, yet it was good management practice to accomplish it.

2. <u>Engineering Evaluation VS Engineered Estimates</u>

Most of the utility systems for which PWC San Diego had responsibility were constructed during World War II or earlier and were underground, in direct burial or covered

trenches. This made actual visual inspection for condition exceedingly difficult and expensive. Specialized inspection techniques being developed at the Civil Engineering Laboratory under OP-44 direction in 1978 were expected to greatly improve the situation, but engineering evaluations were made in lieu of actual inspections until the new techniques were available. The obvious exceptions to this were when a system failed or when it was accessible. Engineering evaluations considered age, location, usage, life expectancy, type of materials, etc. in making a judgement or when the system should be replaced. MILCON and accrual programs were then developed and submitted based on these evaluations.

The Contractor Quality Control (CQC) Program introduced into construction contracts in about 1972 hurt the activities in the area of deficiency/facility condition identification. CQC essentially made it a contractor responsibility to insure construction was in accordance with plans and specifications, and eliminated the need for a government inspector full time on the project. There was no requirement for the contractor or CQC representative to notify the government concerning the location or condition of existing utilities. As a result a contractor could be engaged in underground utility installations and uncover lines not shown on existing "as-built" drawings or in very poor condition. The "time is money" economics of the competitive construction industry would result in

backfilling the area with no notification to the government. In the past, the government inspector would record these items and notify the activity. The only time the government would be notified of an unusual condition was if it caused a problem for the contractor for which a claim was anticipated.

A clause in the CQC portion of construction contact specifications which would have made it mandatory for contractor notification to the government when conditions of extreme deterioration or unknown/mislocated underground utility lines were discovered would have improved the utility maintenance program.

The maintenance philosophy and inspection techniques used cannot be faulted since they followed good management practices based on the realities of the situation. Unfortunately, they resulted in reporting dificiencies which did not meet the criteria for consideration as BMAR. As such, the actual reportable nondeferrable utility deficiencies were greatly overstated.

H. SUMMARY

The total BMAR figure for PWC San Diego was not very accurate. The definition of what should be considered BMAR was interpreted differently throughout the organization. There was no uniform policy established for screening the AIS to separate projects into deferrable and nondeferrable

deficiencies. The results of the inspection effort which generated the AIS were highly suspect. Personnel, untrained in facilities inspection techniques, were detailed from the production shops to assist the Inspection Branch. Questionable field estimates made by these personnel were used in the AIS and determined the dollar magnitude of the reported deficiencies. Indexing old inspection estimates to bring values up to the current reporting date ignored the liklihood of considerable deterioration of facilities since the original inspection. The duplication of effort for routine and specialized inspections introduced further confusion and conflicts in reported figures.

Adding to the errors in reporting was the lack of financial controls placed on spending for maintenance once the cost center budgets had been prepared and approved. The lack of control resulted in maintenance work not being accomplished and a larger BMAR existing than was reported.

Backlog reporting for utility systems was based almost entirely on engineering evaluations of the systems vice actual inspections. Cost estimates for this work were similarly based upon engineering judgements of facility condition. The procedure resulted in many projects being included in the AIS and MILCON program which were really deferrable in current fiscal year, even though they did represent good facilities maintenance management.

The factors which contribute to the inaccuracies in reported AIS/BMAR estimates were both additive and deductive in nature. However, the errors inherent in the utilities system maintenance philosophy were principally additive. Since this constituted over 97% of the total reported BMAR, it led to the conclusion that BMAR was overstated by a significant amount. Strict adherence to the CNO requirements for deferrability/nondeferrability would greatly reduce the reported figures.

VI. HOW TO REDUCE BMAR

Previous sections of this thesis have shown that the validity of the 1978 reported figure for PWC San Diego BMAR is not only questionable, but grossly overstated. This overstatement was due primarily to the inclusion of valid deficiencies which did not fit within the rigid DOD definition of BMAR. Any program to reduce BMAR must have a reasonably valid total as a starting point. Since a reasonably valid total was not available, the problem of how to reduce BMAR had to be dealt with in general terms.

BMAR was measured in dollars and was reduced by the application of dollars. Decisions had to be made as to what source of funds should be utilized, what projects to accomplish in what order, and what length of time should be targeted for the total reduction of BMAR. There were basically two sources of funds; those generated internal to the Navy Industrial Fund, and those available from external sources. The use of either of these sources for BMAR reduction had both advantages and disadvantages.

A. INTERNAL SOLUTIONS

Almost all income of a Navy Industrial Fund activity was generated by the rates paid by its customers. Large projects were accomplished by accrual, the process whereby a specific portion of the rates was set aside to fund a specific project. Smaller projects were accomplished

within a cost center's overhead budget. The total size of the overhead budget was determined when the rates were established. Increases in the funds available from either of these sources can be accomplished by 1) increasing volume, 2) decreasing other costs (ie. increasing productivity or 3) increasing the rates.

1. Increase Volume

A Public Works Center did not control its volume, its customers did. It worked with its customers to accurately project volume during the budget process, and the projected volume was used to establish the center's rates and support the customer's O&MN budget request. Large variations between projected and actual volume caused many problems for both the center and its customers. Deliberately seeking a variance from projected volume was therefore not a logical method of increasing accrual or other overhead funds.

2. Increase Productivity

At any given stabalized rate level, increased funds for maintenance can be generated by increasing productivity. The extent to which productivity increases can provide funds for maintenance and eventually result in lower rates is a subject worthy of further research that is beyond the scope of this thesis.

3. Increase Rates

The rates charged by a NIF activity should include sufficient funds to maintain the assets employed to provide the services for which those rates are charged. Theoretically, if a backlog existed due to lack of funds, then previous rates or actual maintenance expenditures, had been too low. Increasing maintenance expenditures to a level at which no growth of BMAR occurs is consistent with the NIF concept of giving visibility to the full cost of services received. This should be done no matter what else is done. Increase above this level to reduce BMAR would result in a temporary and artificial overstatement of full cost. Concern existed as to whether future customers should bear the burden created by undercharges to past customers.

B. EXTERNAL SOLUTIONS

The provision of external funds to maintain NIF assets was not in keeping with the revolving fund concept while provision of external funds to replace assets was part of that concept. Given the age of most of PWC San Diego's utility systems, the division between repair and replacement was by no means clear. Considering this lack of clarity, the magnitude of the backlog and the lengthy period over which the backlog had grown, a one time infusion of external funds may have been the most reasonable and equitable solution to the problem. Some concern existed however that

having once reduced the backlog with external funds, a precedent would have been established and some incentives provided to allow the problem to grow again in the future.

1. MILCON or O&MN?

The two types of external funds available were theoretically for different purposes, O&MN for maintenance and repair and MILCON for replacement. There were, of course, projects which clearly fit into one category or the other. There was also a large middle ground of repair by replacement where either fund source could have been considered appropriate. Given the historical lack of responsiveness of MILCON appropriations for utilities projects, it was only natural for managers to define requirements in terms of O&MN funding. If this was considered to be an inappropriate approach, it was incumbent upon the Navy's top managers to work to improve the responsiveness of the MILCON system. This would have reduced project manipulation within the gray area.

2. Unique External Solutions

PWC San Diego was able to identify and implement unique solutions to specific BMAR problems. The Center was faced with aging boilers used for steam production. The Center purchased its electricity from San Diego Gas and Electric SDG&E. The Center was able to negotiate a contract whereby SDG&E constructed a gas turbine electrical generating plant on the Naval Station. This plant was

used to generate the electricity the Center needed to purchase and the waste heat from the plant was converted to steam which was also sold to the Center. Even allowing for recovery on SDG&E capital expenditures, steam was purchased at a rate cheaper than the Center's costs for producing steam using its deteriorating plants. This approach is unique both in its overall increased efficiency in the use of energy and in the approach of correcting a BMAR deficiency by removing the need for the facility containing the deficiency.

PWC San Diego also had an active program of Master Planning for future utility needs of its customers MILCON projects. These projects often coincidently corrected or eliminated BMAR deficiencies (ie. when a pier was replaced, new utility lines were provided to meet the requirements of the modern ships that would use the pier).

These reductions in BMAR were truly serendipitous and difficult to predict, however the reductions were significant and well worth pursuing whenever the opportunity arose.

C. TIME SCHEDULE FOR SOLUTION

Discussion at NAVFAC and OP-44 in 1978 was in terms of a five year program to reduce BMAR to zero. This time period was based on balancing a desire to accomplish reduction in the shortest time possible and a subjective judgement

of the maximum temporary annual increase the appropriation system was likely to tolerate. Research at San Diego revealed that certain physical restraints dictated a longer period. PWC San Diego Utility managers felt that "...a BMAR reduction program could not be executed in less than 10 years because of the need to minimize disruption of ongoing utility and other station operations and to effectively coordinate the work with other MILCON programming for expansion, alteration, and modernization" [Ref. 16]. This statement, that the reported BMAR could not be accomplished in one or even five years even if funding was avilable was in contradicition with the definition of BMAR which states that these nondeferrable projects are only deferred because "...lack of resources prohibits accomplishment in that fiscal year" [Ref. 1]. It was possible, however, that a list of projects, each one valid in its own right and deferred only due to lack of funds when considered individually, must be accomplished over a much longer time span due to the aggregate disruption that would be generated by accomplishing them all at once. This is important in that it shows that the establishment of a timetable for reduction of BMAR is more than a budgetary problem. Any schedule for BMAR reduction proposed by budgeteers must include consideration of the interaction and disruptive effects of correcting the major components of BMAR.

D. RECOMMENDED SOLUTION

The widespread lack of understanding of the definition of BMAR resuted in projects suitable for accomplishment by MILCON being included in BMAR at PWC San Diego. This led to the impression that MILCON funds were appropriate for reduction of part of BMAR. By definition, MILCON projects are not included in BMAR. The application of the proper definition of BMAR, while not physically accomplishing any projects, will reduce reported BMAR to true BMAR, MILCON funds would no longer provide reduction other than the occassional serendipitous effect.

Accordingly, there are only two choices of fund source possible; a one time infusion of O&MN funds provided by the PWC's major claimant or an increase in rates chared customers. Rates paid by customers also come from the O&MN appropriation so the only choice to be made is what path the O&MN funds should take. Routing funds through the PWC's customers though more consistent with the NIF concept is a lengthier, more uncertain funding chain. O&MN funds are utilized for many things besides maintenance and repair, and it is the low priority placed on maintenance and repair by operational managers that promoted BMAR growth in the first place. Consequently, there would be no guarantee that all additional O&MN funds appropriated specifically for BMAR reduction at NIF activities would make their way to that end. It is therefore recommended that since a

specific portion of the O&MN appropriation must be justified for this purpose, funds should be provided directly to the end user (in this case, PWC San Diego) and "fenced" to insure utilization for the intended purpose.

Once a reasonably valid total for BMAR is established, a specific schedule for reduction that considers both budget climate and physical constraints can be established.

VII. CONTROL OF BMAR GROWTH

A. COST OF OWNERSHIP

1. Concept

Adequate facilities maintenance requires planning and funding in two separate and distinct areas. The first consideration is that of reducing the current BMAR to an acceptable level so that all identified nondeferrable deficiencies are corrected. This aspect was addressed in Section VI. The second part of the program concerns prevention of future growth of BMAR. This is directly related to the concept of minimum cost of ownership.

In general terms the "minimum" cost may be considered to be the amount of funding necessary to offset the routine maintenance requirements of active facilities. "Cost of ownership" will exist regardless of past funding levels or current condition of plant. The "minimum cost of ownership" should be the steady state maintenance funding requirements determined <u>after</u> the BMAR has been reduced to zero. Funding trends below this level result in consumption of plant assets and an accumulation of a nondeferrable maintenance backlog.

2. Cost of Ownership and Current Plant Value

OP-44 was interested in developing a rational macro-level approach to funding the minimum cost of ownership of active Navy facilities. The method selected was an expression of annual maintenance funding required as a

percentage of Current Plant Value (CPV). Working with limited data, a linear regression analysis approach was used to identify this relationship. The analysis showed that, on the average for all 18 ICs, the Navy must spend 1.2% of the CPV of its real property each year to provide adequate maintenance.

Current Plant Value (CPV) is a computer generated dollar estimate of today's cost to construct a facility that is physically equivilant to a facility in inventory (ie. the same design, configuration, materials, building technology, etc.); it is the expected cost to replace <u>in kind</u>. How CPV is computed has a direct bearing on the magnitude of the percentage figure used to determine annual maintenance funding requirements. It is important to note the accuracy of CPV will have no effect on the dollars actually required, only upon the stated percentage figure.

The CPV of Class II facilities in the Navy's inventory was estimated using a set of cost escalation multipliers which were computed annually based upon averages obtained from the Marshall and Stephens Indices of Building Cost Factors. A set of multipliers existed for each of the construction types: permanent, semipermanent, and temporary. The CPV does not necessarily indicate the amount that the government would have to pay today to acquire a building of the same size to perform the same function, since facilities such as standards and criteria, building

materials and technology, etc., change over time. A measure of the cost to construct a functional equivalent of an existing facility is useful for planning for relocation or in repair vs. replacement decisions. This measure is defined as the replacement cost and is not considered herein.

The CPV of Class II facilities is an estimate required in reports from the Naval Facilities Assets Data Base for maintenance funding management purposes, is reported in the annual P-164, Detailed Inventory of Naval Shore Facilities, and is summarized in P-319, Statistical Tables of Military Real Property. Since Naval facilities range in age over two centuries, inflation precludes the use of acquisition costs as a measure of value.

Due to the importance attached to CPV, NAVFAC commissioned a study to look into the validity of using the Marshall and Stephens Index. The study found relatively small variations between multipliers derived from various indices, and recommended that the Marshall-Stephens multipliers be continued in use for computation of CPV [Ref. 17].

It was further pointed out in the study that the use of any cost index to compute CPV over a large number of years is an inherently error-prone procedure. The error in CPV was further compounded in the approach taken by the Navy to obtain the basic cost figure to which the multipliers is applied. This cost figure was defined as the total of

the acquisition cost plus all of the capital improvement costs. This total was then escalated from the acquisition year. Thus, the older the facility and the more capital improvements which have been accomplished the greater will be the upward bias of the CPV computation. The net result was probably a greatly overvalued CPV total.

1.2% of CPV had been determined to be the figure which will generate sufficient funds to insure that Naval Shore establishment is maintained in a steady state, or zero BMAR growth, condition. The danger of having a grossly overstated CPV is that if it is reduced to a correct lower value, the applied percentage figure would have to be much higher to generate the same level of maintenance funding. Increasing the percent of CPV figure could create problems in the Congressional appropriation chain even though the dollar amount remained the same. People become accustomed to thinking in terms of some percent of a figure rather than in terms of dollars.

3. Industry Maintenance Practices

Facilities maintenance practices in private industry proved to be very infertile ground in researching the cost of ownership concept. Consequently, very little research effort was expended in this area.

Industry maintenance funding was predicted upon historical spending data and current year profit positions. If the amount spent on maintenance the previous year seemed

about right, this figure was used as a base for the current year and then escalated for inflation. Maintenance for any additions to plant facilities or capital investments were computed at the same unit rate (ie. dollar rate per square foot of new facility).

This philosophy was heavily influenced by the economic realities of the competitive business world. Industry maintenance management objectives were preceived to be the protection of the company's capital investment and to increase profits. Maintenance of safety standards was interwoven into these two objectives. However, the amounts actually spent for maintenance were dependent upon the financial position of the company for the previous year. When profits are declining maintenance work is deferred, starting with non-production assets.

Maintenance funding based upon cost of ownership as a percent of replacement value was not being used in any of the four firms questioned.

4. <u>California State College and University Maintenance Programs</u>

Many large university and college campuses in California have facilities similar to those found on an average Naval installation. It was anticipated that maintenance management problems might also be very similar. Research was undertaken to determine how some of these institutions of higher learning identified maintenance

deficiencies and justified funding requests. It would be of particular interest to know whether or not maintenance funding requirements were identified as a percent of CPV or whether there was a deliberate process to determine the cost of ownership.

A representative from the office of Associate Vice President for Administration at California State College Sacramento was contacted concerning their maintenance program [Ref. 18]. It was learned that the college had no planned inspection program and used neither depreciation or life cycle costing for facility replacement. Two fund sources were avilable from the State Legislature, one being Capital Outlay used for acquiring new assets or replacement of old facilities, and the second an Operating Budget for routine operation and maintenance of the campus. There was direct and open competition among the California State Colleges for these funds. The larger maintenance and repair projects were submitted to the Legislature only when requested. Funds for replacement of facilities beyond their economic life were requested from the Legislature as the need arose. There had been no attempt to study the cost of ownership for the campus nor was any planned.

Personnel from the Deferred Maintenance Department at the University of California Berkley campus were interviewed on the same subject. This facility had a formal inspection program using a manual card system for scheduling.

Any identified deficiency which could not be corrected in the year discovered was carried as a backlog. Operation and maintenance funds were budgeted and requested on the basis of the total square footage of structures on the campus. No life cycle costing for facility replacement was attempted and no cost of ownership was computed. The University did use CPV as computed by the insurance carrier, but it had no connection with maintenance.

Perhaps the most sophisticated facilities maintenance management program was being followed at the University of California at San Diego (UCSD) /Ref. 19/. Personnel in the Maintenance Department had conducted an exhaustive study on work elements to demonstrate the need for more funds. A computerized utilities monitoring system having limited off-line batch processing capability was useful in the study. Unfortunately little came of the effort as funding for all California State Universities continued to be allocated on the basis of facility squre footages, regardless of use. UCSD deliberately retained as large a backlog of identified deficiencies as possible to justify funding requests in the competitive system. This was perceived as the only way to insure getting an equitable share of the available money.

The campus used a rather unique approach to routine day-to-day maintenance. Sixty percent of the annual budget was retained for work considered essential by the facilities

manager and forty percent was placed into a quasi "checking account" for each department. From this forty percent the departments paid for requested maintenance. There was no formal facilities inspection program; the Maintenance Department responded to individual requests from other university departments. The university still had its maintenance backlog, but the department personnel were happier because they could get the work done they felt was most important. Competition for funds state-wide obviates the usefulness of cost ownership consideration.

5. <u>State of Texas Formula</u>

The Texas College and University System was the only institutional complex found which utilized a cost of ownership methodology in facilities maintenance planning. Annual budget estimates were obtained using facilities replacement cost times a maintenance cost factor.

The Texas College and University System facilities are much newer than those found in the Naval Shore Establishment. For this reason, replacement cost is a better maintenance indicator than current plant value used by the Navy. The method of computing replacement costs was similar to that used by the Navy in determining CPV. All capital investment costs were added to the original construction cost and the figure was escalated to current dollars. The Navy used the Marshall-Stevens Index in obtaining CPV and the Texas system used the copyrighted Markel's Handy

Appraisal Chart. The Markel Chart considered age, geographic location, and type of construction in determining basic building construction costs. The chart was updated every six months.

Maintenance funding requirements were then found by multiplying the replacement cost by a maintenance cost factor. Percentage factors for the 1979 to 1981 Biennium were as follows:

	Wood-frame Construction	Masonary-Wood Construction	Masonary-Concrete Construction
Air Conditioned	1.90	1.45	1.25
Non-Air Conditioned	1.75	1.30	1.10

Cost factors were determined by the Coordinating Board, Texas College and University System, which was appointed by the State Governor. Cost factors were provided for building maintenance, grounds maintenance and custodial services (APPENDIX L). Factors were reviewed by the Coordinating Board every two years and updated as necessary.

The average factor for all types of non-airconditioned structures was 1.38% in the Texas System which compared closely to the 1.2% used by the Navy. However, since CPV for the Navy was 54.967 billion dollars, this .18% difference would amount to 98.94 million dollars per year in maintenance funds. Every tenth of a percent error in the cost factor applied to a CPV of 54,967 million dollars will be 54.967 million dollars in maintenance.

Such an error becomes even more significant when considering the total MRP funding for FY 1977 was 296.6 million dollars on a Congressional floor of 243 million dollars.

6. <u>Maintenance Economics - Life Cycle Costing</u>

Today's facilities maintenance managers are forced by the "system" to make uneconomical decisions concerning expenditure of funds. Any facility or utility system has an expected economic and physical life. Utilization of economic life is important in a private enterprise system for life cycle costing maintenance, repair and replacement, but it was not being used by the Navy. Facilities are rarely if ever replaced when they should be because of the MILCON programming and funding procedures. As a result, the prudent manager must extend the useful life of a facility or utility system to the point of considering it will have to almost last indefinitely. This rationale causes the manager to spend more on maintenance than sound economics would justify.

The PWC, as a NIF activity, was intended to be run on a business-like basis. Businesses make repair vs. replace decisions with an economic analysis of the life cycle costs of both alternatives playing a major, and often dominate, role in the decision process. Regardless of whether economic analysis, profit position, or other strategic consideration governs the decision, all are considered by a single executive, manager, board, or committee. In the

Navy, the ultimate decision on major projects rests with one of two congressional sub-committees, the one for O&MN funds which in effect decides repair or don't repair, and the one for MILCON which decides replace or don't replace. It should be noted that it is possible and not uncommon for this process to result in decisions to either repair or replace. The Navy managers who define the appropriate action by requesting either repair or replacement funds are responsible for considering life cycle costs and choosing the most economical approach. Appropriation politics and the realities of the budget process often require practical managers to choose the path most likely to be successful whether or not it is most economical. As a result, life cycle costs, if they are considered at all, are often not the dominant consideration in repair vs. replace decisions.

It would be naive to expect bottom up input to result in a change to congressional committee structure. The pressures on congressmen are such that an expense deferred is viewed as an expense saved even if the net impact is uneconomical on a life cycle basis. Refusal to replace when economical increases the requirement for repair funds. Underfunding replacement can result in a brand new facility that is more costly to maintain and is uneconomical on a life cycle basis. Underfunding repair will shorten the economic life of a facility and require replacement at an earlier date. It is a vicious circle and until the funding

decisions are made in a coordinated manner by a single body, such inefficiency will continue.

The establishment of NIF activities made business-like control of the level of repair feasable. Assigning PWC's an equal level of responsibility and authority for utility replacement decisions will provide the second half of the process necessary for sensible and economic operation of utility systems.

7. What is the Real Cost of Ownership?

At this juncture, it becomes necessary to take a somewhat philisophical approach to control of BMAR growth through adequate funding of the day-to-day routine maintenance. This was necessary because sound, factual minimum costs of ownership figures do not exist. The figure of 1.2% of CPV used by OP-44 will suffice as an extreme macro-level approach to maintenance funding, but it breaks down badly when carried to the micro or activity level.

The Public Works Centers have no idea of what the true minimum costs of ownership is. Ture figures are distorted by an excessive BMAR and the absence of valid actual annual maintenance costs. Inaccuracies in CPV serve to further confuse the cost of ownership computations.

Purification of CPV is a topic beyond the scope of this thesis. The Facility Inspection System will be useful in improving accuracy of the basic elements in the Naval Facilities Asset data base and this will correct

many CPV errors. However, one recommendation worthy of further study would be the abandonment of CPV in favor of replacement cost. Replacement costs are much easier to obtain since they involve functionally identical facilities. The applied percentage factors used to convert this figure to maintenance dollars may change but the actual magnitude for any given year would remain constant.

The problems associated with BMAR validation and liquidation were addressed in earlier sections of this thesis. For purposes of this discussion, it will be assumed that at some point in the future, the AIS will receive proper screening to identify true BMAR and a program initiated which will ultimately lead to its elimination. When this point is reached, an accurate minimum cost of ownership figure will still not be obtainable unless additional changes have been made in the current system.

Actual maintenance requirements, both deferrable and non-deferrable, must be known and the cost estimates for each work element must be compared with actual expenditures. As a starting point, inspections and estimate preparation must be accomplished by qualified personnel. This means establishment of a comprehensive training program for PWC Inspection Branch personnel, or contracting the work out to a qualified civilian firm.

The use of Engineered Performance Standards (EPS) must be mandatory in preparation of estimates. EPS, developed

in the late 1950's and early 1960's, were in large part responsible for dramatic increases in facilities maintenance productivity in the Navy Public Works Maintenace Management System. EPS were the building blocks utilized to formulate labor estimates for maintenance work. They have been allowed to deteriorate over the past decade and become essentially obsolete. EPS could be uniformly applied Navy-wide and would provide a standard of performance against which the actual cost of maintenance might be compared. To be effective, EPS must: (1) be constantly reviewed and updated to reflect new methods, new materials, new technology and other developments that affect standards; and (2) have their use in the field by trained personnel monitored to assure compliance with the EPS and their proper use. Resurrection of EPS or some other uniform standard is considered an essential step in providing the true cost of annual maintenance. Collection of this data for a period of years may then be compared to CPV, or some other plant value indicator, to produce an accurate minimum cost of ownership figure. This data must be broken down by investment category as such information is necessary to funding decisions.

B. BMAR GROWTH CONTROL MEASURES

1. <u>Assumptions Necessary to Proposed Recommendations</u>

Actual value for the minimum cost of ownership

including a breakdown by investment category, did not exist for PWC San Diego at the time research for this thesis was conducted, and their derivation was impossible within resources available to the authors. The following discussion is based on the assumption that these figures will be available at some reasonable time in the future. This assumption was necessary in order to provide a starting point from which to logically develop the discussion into a proposed workable solution.

Not knowing with some degree of precision what the actual cost of ownership was also made it impossible to recommend a single solution which would categorically provide the necessary funds. Therefore, it is assumed that once the BMAR is reduced to zero, the minimum cost of ownership will be less than the total maintenance funds which can be generated from the NIF stabilized rate structure. Stated another way, money generated through the production overhead and utility rates will be sufficient to fund the routine day-to-day maintenance requirements.

It was also necessary to clarify the definition of minimum cost of ownership. This was assumed to be the routine daily maintenance requirements of any Naval shore activity where the manager functions as if facilities will have to be retained well beyond their economic life. This annual figure would be lower if life cycle costing was practiced and facility replacement was assured using MILCON

funds. It would be higher if both maintenance and replacement costs were to be recovered through the rate structure and both were considered cost of ownership.

PWC San Diego proposed a cost of ownership figure of 2 percent of Current Plant Replacement Value (CPRV) /Ref. 16/. This 2 percent equates to an estimated 8 million dollars annually. Historically, 1.3 million dollars was being spent for day-to-day maintenance. The remaining 6.7 million dollars would be used for repair, replacement and modernization work for both short and long term projects. This was a reasonable maintenance management approach, however, it departed from the accepted OP-44 concept of minimum cost of ownership. The proposed program contained elements necessary to correct deficiencies which clearly required construction.

For purposes of this thesis, only maintenance requirements were considered to constitute the minimum cost of ownership. Major replacements and construction projects would be funded through the MILCON program. Using this philosophy it was assumed adequate funds would be available through the stabalized rates to prevent a recurrance in BMAR growth using the OP-44 1.2% of CPV figure.

2. <u>Sources of Routine Maintenance Funds</u>

There were three potential fund sources available to pay for PWC San Diego maintenance; O&MN, minor maintenance and major maintenance. Supplemental O&MN funding as

a long term solution to cost of ownership was not considered a viable source as this would tend to abrogate the NIF concept of self-sufficiency.

Minor maintenance funds were defined as money generated from an overhead factor applied to all direct labor hours associated with production activities. These funds were utilized for routine maintenance of PWC production assets and were programmed for use in the Shop Improvement Program. The rate structure appeared more than adequate to fund the cost of ownership associated with production facilities.

The most significant source of funding was termed the major maintenance and accrual program. This program absorbed over 90% of the total PWC San Diego maintenance funds. Major maintenance and accruals were considered to be that work paid for with funds obtained by applying an overhead factor to all utility rates. The table on the following page shows that portion of the stabilized rate which was being applied to major maintenance in FY 1979 and estimates for FY 1980.

3. Maintenance Control Methods

Establishment of control mechanisms was considered absolutely essential to the success of a PWC facilities maintenance management program which will prevent BMAR growth. Required control mechanisms were to two types, managerial and financial.

Utility	FY 1979 Total Rate	FY 1979 Major Maint.	FY 1980 Total Rate	FY 1980 Major Maint.
A/C Electricity (MWH)	60.00	1.35	72.50	1.62
Steam (MBTV)	7.30	.45	8.95	.38
Gas (KCF)	4.00	.43	3.50	.65
Fresh Water (KGAL)	1.10	.10	2.25	.30
Salt Water (KGAL)	1.40	.26	1.00	.27
Air (KCF)	.30	.10	.65	.06
Sewage (KGAL)	.65	.10	1.00	.06
Total Major Maintenance Funds Generated	2.5 million		3.2 million	

Any maintenance program must have a central manager to assure objectives are accomplished efectively and efficiently. For a non-PWC activity, this is the responsibility of the Public Works Officer (PWO). This single individual, operating with sound understanding of facility condition and knowledge of command objectives, makes the decisions on how and where to obligate maintenance funds.

Who is the PWO at a Public Works Center? At PWC San Diego, there was no single individual with responsibility for maintenance management of all PWC assets. Each Cost Center Manager, acting independently, was managing his own mini-maintenance program. This system prohibited application of any center-wide maintenance program and resulted in excessive discreationary underspending of budgeted maintenance funds. One officer or senior civilian must be given the responsibility and authority to conduct a PWC-wide maintenance program.

This individual would be responsible for the AIS including generation, validation and submission. He would also be responsible for monitoring the maintenance program to insure all budgeted resources are expended in the proper area. Under the new PWC organization, the most logical officer to be assigned this responsibility would be the Planning Officer. At PWC San Diego, the Planning Officer was already responsible for the AIS and his responsibilities

required sufficient knowledge and experience to manage a maintenance program.

To function efficiently, the PWC maintenance manager must have financial control over the budgeted funds. Under the system which existed at PWC San Diego, there were no controls. Cost Center Managers had discretionary authority over maintenance funds, the command could withdraw cost center funds for specific designated programs, such as Shop Improvement Program (SIP), and accruals could be manipulated. The approved operating budget, consisting both of planned expenses and expected outputs, is the guideline for operations. Presumably, management wants the organization to operate in a way that is consistent with this plan, unless there is a good reason to depart from it.

Accrual manipulation represented a significant potential dollar magnitude of discretionary spending. The Navy Industrial Fund Handbook for Public Works Centers, NAVSO P-1718, provided explicit guidance on accruals for major maintenance, repairs and alterations /para. 9212 Ref. 20/. Major maintenance, repair and alterations were defined as those projects undertaken periodically to restore or maintain plant, equipment and real property of the Public Works Centers to such a condition that they may be efficiently utilized for their designated purpose. Projects had to be accomplished as a single undertaking for which the costs would be incurred in a relatively short period,

whereas the benefits may be spread over several years. Projects estimated to exceed $25,000 and planned for accomplishment during the ensuing fiscal year required submission to the Naval Facilities Engineering Command for review and approval. The estimated cost of these projects had to be accrued over a twelve month period in order to facilitate customer workload planning.

However, the accrual program at PWC San Diego was experiencing some difficulty. There were problems with being able to execute all accrual projects once the money was available. The principal cause of this situation was a shortage of personnel necessary to design, award and administer the contracts

There was also some manipulation of funds within the program. The impact of any major unanticipated rate increases by the utility companies was being offset by simply stopping accruals in the specific area affected. Money which would have gone to an accrual project went instead to the local utility company. This practice was employed rather than incurring an annual operating loss or requesting an increase in the PWC Corpus. The activities involved would suffer from lower quality utility service due to deferred maintenance and BMAR would grow.

A single set of utility rates was established for all PWC San Diego customers activities [Ref. 21]. This meant that all activities receiving a utility service

but having no accrual projects would pay for the accrual projects at other activities. It was also necessary to accrue money from one high volume utility rate in order to obtain sufficient funds for accomplishment of a major project in a low volume utility. Funds accrued in these ways were not always being spent on the project for which they were intended.

There is a delicate balance between the restrictions that are desirable in order to curb imprudent spending, and the restrictions that are undesirable because they unduly curb the Cost Center's Managers' ability to make decisions on how to best use available resources. However, at PWC San Diego the majority or managerial decision making would take place during the A-11 budget formulation stage when Cost Center Managers submit and discuss their budgets with the Budget Review Board. Once the budget is approved, financial controls should be implemented to minimize discretionary spending.

C. FINANCIAL CONTROL RECOMMENDATIONS

The PWC San Diego must implement financial controls for both major and minor maintenance together with designation of a single officer responsible for monitoring compliance. The recommendations contained herein were directed specifically at PWC San Diego, however, NAVFACENGCOM approval/assistance will be required and there would be

an application at all NIF activities.

Accruals are reported separately in the PWC Financial and Operating Statements, but with insufficient detail or controls. This was evidenced by incurring costs above the project approval amounts as reported in the 30 September 1978 Report. NAVFAC should assist in establishing a separate Cost Account for accruals associated with BMAR. A separate Cost Account would provide the control and accountability necessary to insure funds are spent as approved by higher authority. Accruals should never be used to offset utility rate changes.

PWC San Diego should establish a separate Job Order numbering system within each Cost Center, or PWC-wide, to identify maintenance funds rather than simply including them in the listing of overhead costs. The maintenance funding level approved in each Cost Center's budget should represent a "maintenance floor" with any spending less than the approved amount requiring approval of the Commanding Officer or the Facilities Maintenance Manager.

Separate identification, control and reporting for maintenance funding will also greatly facilitate trend analysis and record keeping. Under the existing system, it was impossible to identify with any accuracy the maintenance patterns for PWC San Diego or sources and amounts of money actually spent on BMAR work.

The concept of command designated programs should be continued at PWC San Diego. An example of this is the Shop Improvement Program (SIP), which will correct many BMAR dificiencies. Command initiation and interest in the SIP insures funds designated for the program will be spent as intended. An expansion of the dedicated program concept into other areas of major BMAR deficiencies will greatly facilitate maintenance control efforts.

VIII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

1. BMAR Definition Inadequate

The definition and intended content of BMAR (previously BEMR) have changed several times since the early 1960's. The definitions of BMAR contained in the instructions available to reporting activities were incomplete and inconsistent. Interpretations were not consistent between or within reporting activities. This situation meant a meaningful BMAR total for all activities could not be generated.

2. BMAR Deficient As Indicator of Condition

Considering the nondeferrable portion of DC 1 and 2 as BMAR results in a condition indicator that represents only a portion of the picture of facilities condition (ie. that portion that is nondeferrable and correctable by O&MN functional category M funds). By excluding DC 3 through 6 before considering deferrability, BMAR does not even represent total nondeferrable deficiencies. BMAR was an indicator of the need for O&MN maintenance funds, BMAR was not a facilities condition indicator.

3. BMAR Overstated

As a result of inadequate BMAR definition, deficiencies not meeting the intended definition of BMAR were included and BMAR was overstated. PWC San Diego reported

its BMAR to be 76.1 million. NAVFAC considering only DC 1 and 2 restated PWC San Diego's BMAR as $41.6 million. Removing unprogrammed MILCON projects reduced this figure to $10.8 million.

It can therefore be concluded that PWC San Diego BMAR is in the neighborhood of $10 million (ie. not $40 million or $70 million). This number does not consider the significantly larger volume of non-BMAR deficiencies which have been identified, should be reported and considered, and ultimately will have to be dealt with.

4. Inspection System Prone to Errors

The facilities inspection program at PWC San Diego had several weaknesses which introduced errors in reporting. Inspections were scheduled using a manual system under which slippages occurred. When facilities were not inspected, reports were updated by an indexing method that ignored deterioration occurring between inspections. A shortage of permanent inspection personnel necessitated the detailing of untrained and inexperienced personnel from the production shops. The cost estimates prepared by this system were questionable.

5. CPV Inaccurate

The reported current plant value (CPV) is not accurate. The procedure of aggregating all capital improvement costs with the original construction cost of a facility before indexing this total to present dollars

introduced a significant upward bias to the CPV. Errors in the Naval Facilities Assets data base compounded the problem of determining an accurate CPV. This error resulted from ineffective maintenance of the activity property record cards.

6. Repair/Replace Decisions Uneconomically Made

The separation of MILCON and O&MN funding approval chains for repair and for replacement prevented comparison of alternatives on a life cycle cost basis. Efficient allocation of resources could not result without such a comparison.

7. Cost of Ownership Not Known

PWC San Diego had no data from which to determine annual cost of ownership. The existing system did not separate deferrable and nondeferrable work. Accurate engineered performance standards were not compared against actual performance by the labor force. Subjective evaluation by the cost center managers of what maintenance work was required, was the key factor in the funds expended on the annual cost of ownership. Maintenance funds were not being spent to the full level budgeted.

8. No Central Control of BMAR Reduction

Actual overhead expenditures within cost centers were discretionary within total budget. This resulted in underspending amounts originally budgeted for maintenance.

Selection of actual maintenance work to be accomplished during the fiscal year was the decision of each cost center manager. Other than the Shop Improvement Program, there was no center-wide standard policy or command guidance on determination of priorities or definition of deferrable and nondeferrable work. The result was accomplishment of nonessential work and a growth in BMAR.

B. RECOMMENDATIONS

1. Purify PWC San Diego BMAR

The following steps should be understood and accomplished by PWC San Diego:

a. Remove DC 3 through 6 from BMAR

b. Remove unprogrammed MILCON from BMAR

c. Assign responsibility to a high level executive or review board to screen and remove deferrable projects from BMAR.

2. Revise Existing Instruction(s)

The existing instruction(s) covering BMAR should be revised to include the following:

a. A clear unambiguous definition of BMAR as intended.

b. The DOD criteria for deferrability.

c. Some explanatory examples showing the application of the criteria.

d. A statement that BMAR is only the non-deferrable portion of DC 1 and 2.

e. Clarification of the distinction between BMAR and NMAR if both are necessary or eliminate one of them

f. Specific assignement of responsibility to screen for removal of deferrable deficiencies.

g. Specific assignment of responsibility to screen for removal of projects to be accomplished between 2 March and 30 Sept. Require screening to be based on either projected funding or actual accomplishment, not both.

h. A method of including unprogrammed MILCON on the annual inspection summary.

i. A requirement for Step 1 special project submission or preliminary MILCON submittal via the Shore Facilities Planning System (SFPS) as appropriate, prior to deficiency appearing on a second year's AIS. This would reduce capriciously identified deficiencies and encourage identification of firm requirements.

Until revisions are made to the instructions, ALL major claimants should provide specific written guidance in these areas. An example of such guidance from a major claimant which covers many of the points above has been included as APPENDIX I.

3. Provide A Composite Condition Indicator

Provide a total facility condition indicator from data available in the present system. Relable the AIS Summary Report #2 to highlight total deficiencies regardless of funding process. Use the second AIS Summary Report #2 already required to show the nondeferrable portion of the total. (This would require screening for deferrability of all deficiency codes.)

4. Improve Inspection System

Personnel conducting facilities maintenance inspections and preparing field estimates for use in the AIS

should receive formal training. The practice of temporarily detailing personnel from the production shops should be discontinued in favor of a formal transfer of ceiling points or contracting out at least a portion of the inspection effort.

5. Reestablish Use of EPS

PWC San Diego should reimplement the use of Engineered Performance Standards (EPS). Values found in the old EPS documents should be updated to reflect current practices and technology. Once implemented, the program should be constantly monitored to retain accuracy.

6. Establish An Accurate Estimator of CPV

Develop a substitute factor which will provide a more accurate CPV. Facility square footage could be used and would be an easy data element to verify. This could then be multiplied by a factor to predict current plant value. The factors would be developed by considering key elements including age, geographic location, type of construction and use. Such factors could be purified annually as their validity is established.

7. Make Utility Replacement A NIF Responsibility

PWCs should be given the authority to replace utility systems at the end of their economic life through the accrual process. Allowing NIF activities to fund replacement projects would require Congressional approval. Such approval would relinquish a jealously guarded Congressional prerogative and is unlikely.

8. <u>Determine Cost of Ownership</u>

PWC San Diego must identify its actual annual cost of ownership. Implementation of proper financial controls over maintenance funds, use of EPS, accurate determination of deferrable and nondeferrable work are necessary to identify this annual figure.

9. <u>Establish The Position of Facilities Maintenance Manager</u>

PWC San Diego should assign responsibility and authority to direct its maintenance management program to a single individual. Application of limited PWC resources must be coordinated to insure the most critical nondeferrable maintenance projects are accomplished first, irrespective of cost center location. This responsibility should be placed with the Planning Officer.

10. <u>Establish Financial Controls for BMAR Funds</u>

It is recommended that the PWC San Diego establish a separate Job Order numbering system to account for minor maintenance funds, and the NAVFACENGCOM assist in establishing a new Cost Account for BMAR reduction accruals. The center facilities maintenance manager should have control of these funds with only he or the Commanding Officer having authority to deviate from the budgeted figures.

APPENDIX A

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO
Ser 44/721784
21 Sep 1978

MEMORANDUM FOR THE DIRECTOR, FISCAL MANAGEMENT DIVISION (OP-92)

Subj: OP-44 Review of the MRP Portion of the FY 80 NIF A-11 Budget

1. As we have discussed, my staff is undertaking a review of the MRP portion of the NIF A-11 budget. We have had several general discussions of this subject in the past. It may be helpful for me to put some of my present thoughts in this memorandum to be sure I am on the right track.

2. Starting in March of 1977, based upon our first Annual Inspection Summary (AIS) for NIF activities, I began to see signs of what could potentially be a major problem in the condition of the Navy's NIF plant property. The AIS revealed a BMAR in excess of $174 million. The 1978 AIS, with a BMAR in excess of $180 million, reinforced my concern. A further analysis by Investment Category, revealed major deficiencies in waterfront facilities, maintenance and production facilities and utilities systems. It appears that our NIF community is consuming its physical plant in the interests of maintaining artifically low stabilized rates.

3. I believe it can be safely assumed that some stabilized rates will have to be raised if the NIF community is to accrue sufficient resources to maintain their physical plant at the "minimum cost of ownership" level without any reduction in the backlog. I realize that the impact of these increases will be felt in the customer accounts and must be properly programmed. The earliest this can be accomplished is in POM 81.

4. Because of the relatively large size of the backlog, the best approach for its reduction is not so clear cut. Reduction of the BMAR in a reasonable length of time (5 to 10 years) may require significant increases in stabilized rates, increases that may not be feasible. Two alternatives appear reasonable to me:

a. Directly fund CNM NIF activities with sufficient O&MN resources to eliminate the BMAR in a systematic manner over a reasonable length of time (say 5 years). This would have the advantage of establishing a dedicated program which would directly attack the problem and be relatively simple to execute and moniter. A disadvantage of course is that this method establishes a

precedent of "bailing out" our NIF activities from a history of poor management practices. I recognize that it is contrary to the NIF management concept.

b. A second method would be to establish a rate increase of limited duration (say 5 years). The customer accounts would be increased, and the funds injected into the NIF activities through the overhead portion of the higher stabilized rates. Such a procedure would work fairly well with shipyard's, NARF's and PWC's, however, it may have little impact on ordnance activities whose workload is on the decline, and which have a large inventory of underutilized facilities.

5. Regardless of which method is finally selected, the problem will have to be addressed in the development of POM 81. Revising NIF stabilized rates to reflect the "minimum cost of ownership" will require an increase to customer accounts, and elimination of the $180 million FY 80 BMAR will require either additional increases to customer accounts or a dedicated program amount from FY 81 to FY 85. I would appeciate your comments.

6. I will keep you informed of our progress.

Very respectfully,

R. F. Jortberg

R. F. JORTBERG
Director, Shore Facilities
Programming Division

APPENDIX B

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO
Ser 921C/588465

1 DEC 1978

MEMORANDUM FOR DIRECTOR SHORE FACILITIES PROGRAMMING DIVISION (OP-44)

Subj: MRP for NIF Activities

Ref: (a) Your Memorandum of 21 Sept 1978

1. You have my full support in your efforts to bring our NIF plant up to a reasonable state of repair. I share your view that the underfunding of this maintenance has been so prolonged that it may take 3 to 5 years to "dig" our way out. My preference would be to accomplish this through the NIF rather than by a direct infusion of O&M,N into each NIF activity. However, this may not be feasible in some cases. Believe that we will need to look into a dual channeling of funds, a partial O&M,N infusion coupled with increased NIF stabilized rates to fund the remainder.

2. I understand that Cdr Blondin has met with you and generally discussed the problem. As I see it, our tasks are to:

a. Develop a phased funding requirement to restore a reasonable state of repair and drive this requirement into the POM and FYDP.

b. Determine what funding vehicle we will use to fund these requirements.

(1) Determine if a direct infusion from O&M,N is appropriate and if so in what amount and timeframe.

(2) Determine how the balance of the costs will be passed on to NIF customers. We could increase the rates of just the impacted NIF activities or increase the rates across the total NIF customer range.

c. Put each NIF activities' rates on a track which funds the "minimum cost of ownership" each year.

3. Recommend that our staffs get together on the problem, confirm its approximate magnitude and draw up a plan of action.

E. P. TRAVERS
RADM, USN
Director, Fiscal Management
Division

APPENDIX C

RPMA SUMMARY STATUS
O&M, NAVY
($ MILLIONS)

	FY-67 (1)	FY-68 (1)	FY-69 (1)	FY-70 (1)	FY-71 (1)	FY-72 (1)	FY-73	FY-74	FY-75	FY-76	FY-77	EST FY-78	EST FY-79	POM FY-79
M-1	117.0	122.6	121.0	116.5	115.9	122.1	130.7	156.4	179.7	186.6	185.2	204.0	223.9	194.0
M-2	20.7	17.9	19.4	34.0	26.2	19.7	19.4	32.1	72.4	61.6	89.9	110.0	134.0	124.0
R	14.1	15.6	15.7	10.3	10.4	12.0	14.4	12.2	20.3	16.1	21.5	21.3	20.5	22.0
MAP	161.0	155.2	166.9	160.0	152.6	155.0	172.5	200.7	272.4	264.1	296.6	326.9	370.6	350.0
M	85.7	72.2	77.6	76.9	81.5	93.1	97.0	121.5	170.1	192.2	190.6	226.9	252.7	247.0
P	61.7	89.7	100.1	102.4	99.6	106.0	108.9	114.2	127.6	162.1	159.7	171.2	170.5	156.0
RPMA	309.2	310.1	244.6	341.1	332.7	356.9	378.4	436.4	569.9	590.4	646.9	725.0	1,010.6	752.0
TOTAL BACKLOG	184.2	222.4	264.2	274.1	336.0	359.5	261.1	400.0	460.0	620.0	716.7			
(2) BMAR	-	-	-	-	-	-	-	-	-	-	486.0	519.0	556.0	522.0

(1) Includes both O&M, Navy and O&M, Navy Reserve
(2) FY-77 was the first year for reporting BMAR with a strict interpretation - must have immediate adverse mission impact or serious adverse economic impact due to accelerated deterioration

TABLE 7-1
Deficiency Codes

Deficiency Code	Description	Type of Entry	Cost Limits	Submittal Requirements	Type of Project	Remarks
1.	Maintenance & Repair	Summation of Repair or Maintenance items for a single facility not included in Special Project for that facility	No Limitation	N/A	N/A	Items need not be accomplished as a single undertaking (Does not represent a concurrent requirement)
2.	Maintenance & Repair	Summation of Repair or Maintenance items for a single facility to be included in a Special Project	Over ALOF	Submitted or scheduled for submission as Special Project	M or R	Items to be accomplished as a single undertaking representing a single concurrent requirement
3.	Replacement of entire facility in lieu of repair	Summation of construction costs for a single facility	Under ALOF	N/A	N/A	
4.	Replacement of entire facility in lieu of repair	Summation of construction costs for a single facility	No Limitation, Provided Total Project Cost is Over ALOF	Submitted or scheduled for submission as Special Project or MILCON Project	C or P	If the Minor C or MILCON Project is for more than one building, the cost applicable to each building is to be shown
5.	Demolition or dismantling of entire facility no longer required	Summation of repair costs for a single facility	Under ALOF	N/A	N/A	Cost Account Number 7840 is applicable regardless of Category Code
6.	Demolition or dismantling of entire facility no longer required	Summation of repair costs for a single facility	Over ALOF	Submitted or scheduled for submission as Special Projects	R	Cost Account Number 7840 is applicable regardless of Category Code

ALOF – Activity's limit on funding See OPNAVINST 11010.20C (Latest Edition) for Limits

N/A – Not Applicable

OPNAV 11010/6 BACK S/N 0107-LF-110-1030

APPENDIX E

PWC Yokosuka
TOTAL FY 78 UNCORRECTED DEFICIENCIES

OPNAVINST 11010.34
21 JUN 1977

TYPE A ANNUAL INSPECTION SUMMARY REPORT 1

1. ACTIVITY (Name and Location)	2. U.I.C.	3. PERIOD ENDING	4. MAJOR CLAIMANT / 5. FUNDING SOURCE
PWC Yokosuka		1 March 78	NAVFAC/CNM / 1804

6. I.C. NO.	7. INVESTMENT CATEGORY DESCRIPTION	8. DEFICIENCY CODES TOTALS 1	2
1	AVIATION OPERATION FACILITIES		$
2	COMMUNICATIONS OPERATION FACILITIES	30,400	
3	WATERFRONT OPERATION FACILITIES		
4	OTHER OPERATIONAL FACILITIES	9,100	
5	TRAINING FACILITIES		
6	AVIATION MAINTENANCE/PRODUCTION		
7	SHIPYARD MAINTENANCE/PRODUCTION		
8	OTHER MAINTENANCE/PRODUCTION	303,330	2,284,750
9	RESEARCH, DEVELOPMENT, TEST & EVALUATION		
10	POL SUPPLY/STORAGE	44,150	
11	AMMUNITION SUPPLY/STORAGE		
12	OTHER SUPPLY/STORAGE		
13	MEDICAL		
14	ADMINISTRATIVE	16,290	104,800
15	TROOP HOUSING/MESSING FACILITIES		
16	OTHER PERSONNEL SUPPLY & SERVICES	42,550	
17	UTILITIES	842,830	5,860,410
18	REAL ESTATE AND GROUND STRUCTURES	7,600	86,100
	SUBTOTAL	$1,296,250	$8,336,060
	GRAND TOTAL		9. $9,632,310

APPENDIX F

TYPE A ANNUAL INSPECTION SUMMARY REPORT 2

Refer to table on reverse for explanation and description of deficiency codes

1. ACTIVITY *(Name and Location)*	2. U.I.C.	3. MAJOR CLAIMANT	4. PERIOD ENDING
PWC Yokosuka		NAVFAC/CNM	1 March 78

5. RESPONSIBLE FUNDING SOURCE AND DESCRIPTION	6. DEFICIENCY CODES SUBTOTALS							7. TOTAL COST (1 thru 6)
	1	2	1 & 2 Subtotals	3	4	5	6	
MILITARY CONSTRUCTION, NAVY (1205)								
MILITARY CONSTRUCTION, NAVAL RESERVE (1235)								
RDT&E, NAVY (1319)								
OPERATIONS & MAINTENANCE, NAVY (1804)	1,296,250	8,336,060	9,632,310	32,600	55,000			9,719,910
OPERATIONS & MAINTENANCE, NAVAL RESERVE (1806)								
NAVY INDUSTRIAL FUND (4912)								
OVERHEAD (9600)								
NONAPPROPRIATED FUNDS (9000)								
TOTALS	1,296,250	8,336,060	9,632,310	32,600	55,000			9,719,910

FIGURE 4

APPENDIX G

FEBRUARY 1978

UTILITIES SYSTEMS STUDIES

PWC SAN DIEGO

GENERAL PURPOSE OF PROGRAM

Navy Public Works Center (PWC), San Diego is actively pursuing a long standing program of developing utilities systems engineering/economic studies for all activities under its cognizance. The broad objective of these studies is the establishment, on a valid basis, of detailed master plans of action for more effective management in the production, purchase, operation, maintenance, replacement/expansion, utilization, and conservation of utilities and utilities systems, all on a "systems approach" basis and in the framework of life-cycle cost and energy usage minimization.

SPECIFIC PROGRAM GOALS

1. Development of knowledge of utilities systems including their condition and capability and updating of system drawings.
2. Improvement of system operation procedures.
3. Providing basis for more efficient planning, operation, and maintenance.
4. Identification and definition of valid projects for funding by accrual, urgent MCON, MCON, ECIP, UIP, or any other appropriate funding avenue.
5. Providing a valid basis for orderly planning for replacement of deteriorated systems and for serving future requirements at least life-cycle cost to the government.

6. Identification of specific improvements in the areas of energy conservation and safety.

STUDY METHODOLOGY

Studies are accomplished by both in-house and consulting engineer effort. Those studies performed by consulting engineers require considerable in-house engineering and operational personnel support in order to be of maximum value. In all cases, studies generally include the following steps:

1. Records search of utility systems data.
2. Field investigations of utilities systems.
3. Preparation of updated utility systems drawings.
4. Development of historical data drawings.
5. Preparation of operational schematic drawings.
6. Identification of system deficiencies and repair projects.
7. Analysis of system capacity (existing and planned)
8. Economic evaluation of alternatives.
9. Development of system master plan.

APPENDIX H

4. FACILITIES INVESTMENT CATEGORIES

a. Classification of Shore Establishment Facilities

The Navy's shore establishment includes a wide range of different facilities which contribute to Navy missions in a large number of different ways. To describe the relationships between facilities and missions a classification of these facilities into Investment Categories with related contributions to missions has been made. The following categories are used:

1. Aviation Operational
2. Communications Operational
3. Waterfront Operational
4. Other Operational
5. Training
6. Aviation Maintenance and Production
7. Shipyard Maintenance and Production
8. Other Maintenance and Production
9. RDT&E
10. POL Storage and Supply
11. Ammunition Storage and Supply
12. Other Storage and Supply
13. Medical
14. Administration
15. Troop Housing and Messing
16. Other Personnel Support and Service
17. Utilities
18. Real Estate and Ground Structures

CHIEF OF NAVAL EDUCATION AND TRAINING
NAVAL AIR STATION
PENSACOLA, FLORIDA 32508

Code 017/09B2

01 FEB 1979

SPEEDLETTER

FEB 9 11 16 AM '79

From: Chief of Naval Education and Training
To: Distribution List

Subj: Preparation and submission of FY 80 Annual Inspection Summary

Ref: (a) OPNAVINST 11010.34 of 21 Jun 1977
(b) OPNAVINST 11010.23D of 15 Mar 1977
(c) OPNAVINST 11010.20C

Encl: (1) OPNAV Form 11010/4 Type A Annual Inspection Summary of Uncorrected Facilities Deficiencies
(2) OPNAV 11010/3 Type A Annual Inspection Summary Transmittal Form
(3) "Example" - Assessment of Conditon and Mission Impact Statement
for DC1 and DC2 By Investment Category
(4) Investment Category Identification & Cross Reference
(5) Deficiency Code Table

1. A Type "A" Annual Inspection Summary, as per reference (a), is required from all activities that perform or have the responsibility for maintenance and repair of Navy owned and operated property. Tenants who have no plant account, but have the responsibility to maintain and repair the plant account they use, as written in their host/tenant agreement, shall prepare an Annual Inspection Summary or if available shall submit a copy of the hosts' Annual Inspection Summary with the items designated upon which they have funding responsibility for maintenance and repair. Care should be taken to ensure that this property is not reported by both host and tenant.

2. Reference (a) changed the effective date of the Annual Inspection Summary (AIS) to 1 March 1978, (cut-off point) and submission to higher echelons. Accordingly, activity Annual Inspection Summaries (AIS's) are to be submitted to CNET and to applicable functional commands by 15 March 1978. Functional commands will submit to CNET not later than ~~1 April 1978~~.

3. CNET has established a computerized system to receive and consolidate all the information as received from the activities on the OPNAV Form 11010/4 Type "A" Annual Inspection Summary of Uncorrected Facilities Deficiencies. The OPNAV Forms 11010/5 and 11010/6, Reports 1 and 2, and the Cost Account to Investment Category Summary will not be required from the activities for this FY 80 AIS submission. All of the data that is required by CNET to comply with references (a) and (b) will be derived from the activities accurate and timely submissions of enclosures (1), (2) and (3) forms.

4. In order for the computerized system to work properly it is important that accurate and complete Type "A" Annual Inspection Forms be submitted by the activities. Shown below is the "Validation Criteria" that must be followed or the computer will reject the entire AIS or reject that line entry on the AIS. There are nineteen (19) blocks or columns on the OPNAV Form 11014/4 Type "A" - AIS form - the item numbers shown below refer to the block or column number on this form that will be validated:

Item 2 - must have valid UIC no.

Item 6 - must have 50 or less digits including blank spaces

Item 7 - must be present (numeric) for each complete entry

Item 10 - must have 1804, 1205, or 9999

Item 11 - must be present (numeric)

Item 12 - must be present for D.C.1 and D.C.2 line entries

Item 13 - must be present (numeric) for D.C.1 D.C.2 and must match

Enclosure (4) I.C./Cross Reference

Item 16 - (a) must be present (numeric); must be 1, 2, 3, 4, 5, or 6

(b) If D.C.1 is shown: column 9 must be blank and column 10 must be 1804

(c) If D.C.2 is shown: column 17 must be $25 (000) or more and column 10 must be 1804

(d) If D.C.3 is shown: column 17 must be less than $15 (000) and column 10 must be 1804

(e) If D.C.4 is shown: column 17 must be $15 (000) or more

(f) If D.C.5 is shown: column 17 must be less than $25 (000); column 10 must be 1804; column 13 must show 7840 (cost account)

(g) If D.C.6 is shown: column 17 must be $25 (000) or more; column 10 must be 1804; column 13 must be 7840 (cost account)

Code 017/09B2
01 FEB 1979

Subj: Preparation and submission of FY Annual Inspection Summary

Item 17 - must be $1 (000) or more; no decimals shown and all numeric entries represent dollars in thousands (000)

Item 19 - If this line entry is "non-deferrable" leave blank; if this is a "deferrable" line entry put "D" in Column 19

Refer to enclosure (5) Deficiency Code Table for more details.

5. The CNO defination for "Urgent Non-Deferrable" is two fold as follows:

A. The deficiency is mission critical and deferral of corrective action beyond the current fiscal year will adversely impact readiness or

B. The deficiency is expected to result in accelerated facility/equipment/material deterioration, and deferral of corrective action beyond the current fiscal year will have an adverse economic impact.

Non-critical items such as routine interior painting, long term roof repairs or replacements where the roof is not leaking and projected long term repairs or maintenance of class 1 and 2 property may be shown as "Deferrable" DC1 and DC2 items.

6. Uncorrected Facilities Deficiencies should include all known deficiencies that require correction and are not accomplished as of 1 March. The activity submission of the AIS will identify which deficiencies are "Deferrable" as shown above and DO NOT require correction during the current fiscal year by placing a "D" in column 19 of the Type A Annual Inspection Summary of Uncorrected Facilities Deficiencies Form OPNAV 11010/4. No deficiency items less than $1,000 shall be included. Do not include decimal cents or zeros -- round to the nearest $1,000 to be shown as $1. Refer to deficiency codes shown in enclosure (5).

7. Special projects to be performed by contract for which the "Notice of Award" has not been issued by 1 March are considered "not accomplished." Job orders authorized and forwarded to the Maintenance Division on or before 1 March are considered "accomplished." Uncorrected facilities deficiencies which require replacement by military construction and have been included on the Military Construction "Requirement List" (RL) and officially listed on the activity's planning form OPNAV 11000/4 "Project for Correction of Facility Deficiency," should be reported. Particular attention shall be given to entries of funding source Code 1205 to insure that the line item of work is a proper charge to Military Construction funds. Basically, only deficiency Code 4 items would be so identified.

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01 FEB 1979

Subj: Preparation and submission of FY Annual Inspection Summary

8. It has been noted that many of the deficiency Code 2 - Special Projects reported in the FY 79 AIS have not been submitted as special projects. Since the special projects portion accounts for approximately 58% of the total backlog, it becomes ever-increasingly important that these special projects be documented by Step I submissions. Without this supporting budget documentation, CNET is at a definite disadvantage to justify increases in MRP funding. Accordingly, timely submission of your Deficiency Code 2, backlog deficiencies as Step I "Special Projects," in accordance with reference (c), is a very important part of the RPMA management concept.

9. In addition to enclosures (1) and (2) required by reference (a), activities will prepare enclosure (3) assessment (by investment category) of the facilities' conditions under their cognizance and an evaluation of the mission impact of those deficiencies left uncorrected. This is in accordance with reference (b) and an "example" format is shown as enclosure (3). Tenant commands not holding plant account will address those facilities which the addressee has the maintenance/repair responsibility in accordance with a written host/tenant agreement. Under such situations, a copy of the host/tenant agreement is requested.

10. Summary of submission requirements for the activity and functional commands are as follows:

a. <u>Activities</u> will submit a completed copy of <u>all forms and data</u> to CNET <u>and also</u> to their applicable functional command by 15 March 1979 as follows:

(1) Type A Annual Inspection Transmittal Form. (Enclosure (2))

(2) OPNAV Form 11010/4 Type A Annual Inspection Summary of Uncorrected Facilities Deficiencies. (Enclosure (1))

(3) Assessments of Condition and Mission Impact Statements for DC1 and DC2 (combined) by Investment Category. (Enclosure (3))

b. <u>Functional Commands</u> will receive copies of all activity submissions and will consolidate the "Assessments of Condition and Mission Impact Statements" into a Functional Command summary as per enclosure (3) format. Functional Commands will review all activities Annual Inspection Summaries (enclosure (1)) for accuracy, completness and compatibility with the "Validation Criteria" as shown in paragraphs 3 and 4 above. They will closely review the "Deferrable" and "Non-Deferrable" items and liaison with CNET on any problem areas.

Code 017/09B2

01 FEB 1979

Subj: Preparation and submission of FY Annual Inspection Summary

c. CNET will distribute copies of the activities computerized OPNAV Forms 11010/5 and 11010/6 - Reports 1 and 2 to all applicable activities and functional commands.

11. The data contained in the AIS Summaries and in the assessment of condition/mission impact statements forms a vital part of the forthcoming budget process. The accuracy and clarity of the data in this submission will form the basis for the MRP funding in future years and could greatly improve the MRP funding climate if reliable data is provided.

12. Chief of Naval Education and Training point of contact for RPMA and AIS is Mr. J. Heyen and for special projects is Mr. J. Langston. Either can be reached on AUTOVON 922-4146 or FTS prefix 948-4146.

E. T. SMITH
By direction

Distribution (CNETINST 5216.1C):
List I (less 8 & 9); List II (less 7, 8, 9 & 10);
List IV (less 3, 5 through 15, 25 through 29, 32,
34, 37, 41, 45, 46, 48 through 52); List V; List VI;
List VIII
COMFLETRAGRU, Pearl Harbor, HI
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APPENDIX I

Investment Category 01
Aviation Operation Facilities
($000)

"EXAMPLE"

Condition and Mission Impact of BMAR

During the past year an unusually cold and wet winter has accelerated the rate of deterioration to the point where pavements, already in a state of deterioration, are beginning to fail rapidly. Scarcity of funds in the past several years has precluded expenditure of adequate dollars to make extensive necessary repairs to pavements. Only the most emergency repairs could be made with available funds.

Runway, taxiway, parking apron, and blast pad pavements present a continuous maintenance and repair problem due to age, high usage, soil makeup and climate. Conditions which exist generally throughout the NAVEDTRACOM in airfield paving are spalls, cracks, joint seal deterioration, irregular surfaces, pot holes, sinks, low areas, large areas blown out by engine blasts, loose gravel, vegetation growing in and near the paving, markings worn and obliterated, rubber deposits, poor drainage, and erosion.

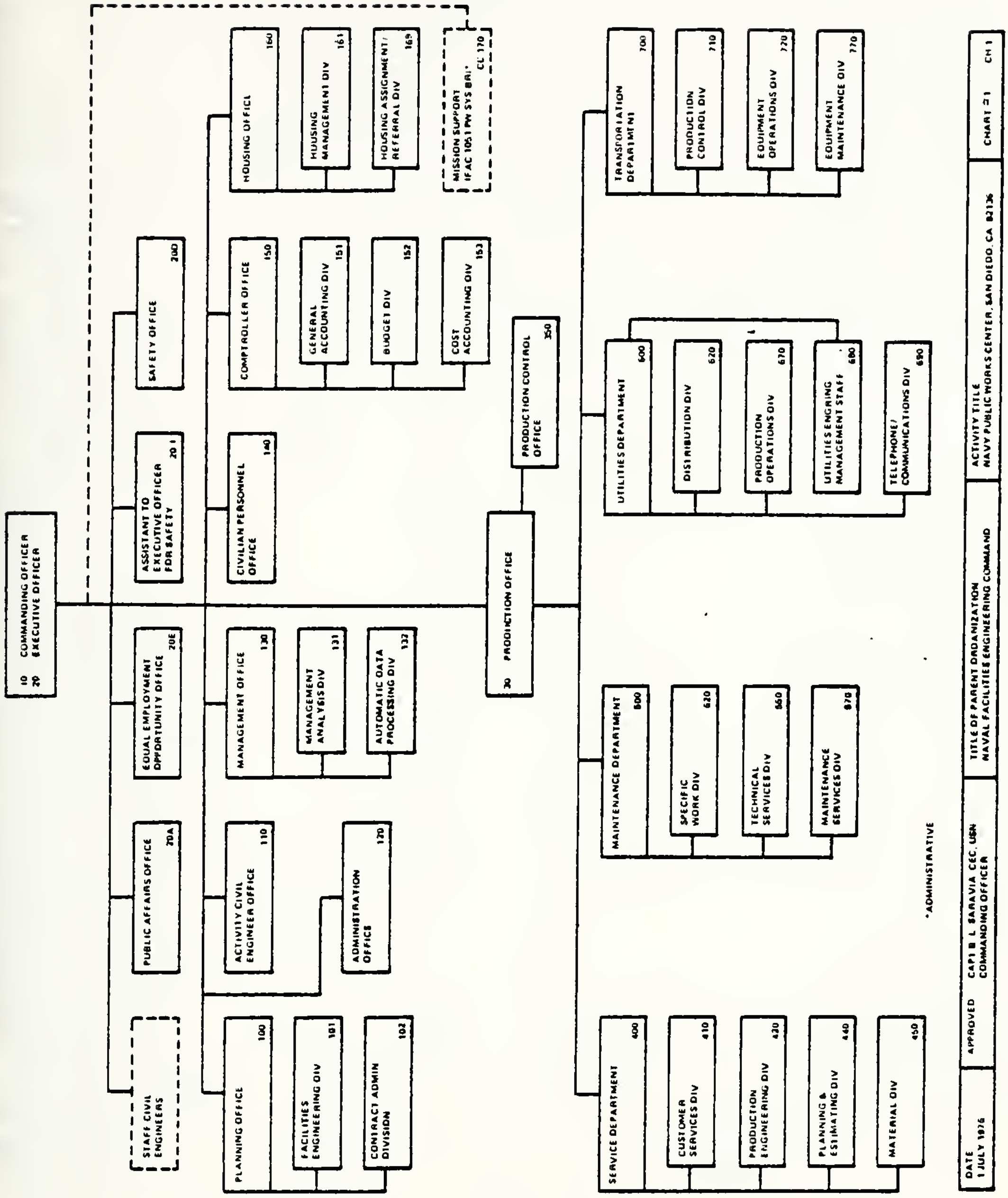
Airfield lighting and navigational aids require repairs to wiring and circuits due to increasing frequency of failures and outages. Expensive radar air traffic control and electronic equipment are susceptible to damage due to leaking roofs in control towers and hangars.

The majority of the Operations buildings and structures, of World War II and prior vintage, are in generally poor condition and are progressively deteriorating.

Impact

Aviation operational facilities are vital to the mission of the NAVEDTRACOM. Lack of adequate repairs to these facilities results in unacceptable flight support conditions and seriously degrades and diminishes the efficiency of this mission. If airfield pavements are not maintained and repaired on a continuing basis, rapid deterioration of the base and pavement sets in which results in even greater expenditures for repairs, more frequent downtime for spot repairs, and loss of aircraft serviceability due to damages or accidents. Loose paving matter or joint seal causes severe and expensive foreign object damage (FOD) to highly sensitive jet engines. Airfield lighting and navigational aids are essential both to the training of the student and for his safety. Lack of dependability of these facilities could result in loss of life and aircraft.

APPENDIX J


10 COMMANDING OFFICER
20 EXECUTIVE OFFICER
STAFF CIVIL ENGINEERS
PUBLIC AFFAIRS OFFICE 20A
EQUAL EMPLOYMENT OPPORTUNITY OFFICE 20E
ASSISTANT TO EXECUTIVE OFFICER FOR SAFETY 201
SAFETY OFFICE 200
PLANNING OFFICE 100
FACILITIES ENGINEERING DIV 101
CONTRACT ADMIN DIVISION 102
ACTIVITY CIVIL ENGINEER OFFICE 110
ADMINISTRATION OFFICE 120
MANAGEMENT OFFICE 130
MANAGEMENT ANALYSIS DIV 131
AUTOMATIC DATA PROCESSING DIV 132
CIVILIAN PERSONNEL OFFICE 140
COMPTROLLER OFFICE 150
GENERAL ACCOUNTING DIV 151
BUDGET DIV 152
COST ACCOUNTING DIV 153
HOUSING OFFICE 160
HOUSING MANAGEMENT DIV 161
HOUSING ASSIGNMENT/REFERRAL DIV 169
MISSION SUPPORT IFAC 1051 PW SYS BR CL 170
30 PRODUCTION OFFICE
PRODUCTION CONTROL OFFICE 350
SERVICE DEPARTMENT 400
CUSTOMER SERVICES DIV 410
PRODUCTION ENGINEERING DIV 420
PLANNING & ESTIMATING DIV 440
MATERIAL DIV 450
MAINTENANCE DEPARTMENT 500
SPECIFIC WORK DIV 520
TECHNICAL SERVICES DIV 560
MAINTENANCE SERVICES DIV 570
UTILITIES DEPARTMENT 600
DISTRIBUTION DIV 620
PRODUCTION OPERATIONS DIV 670
UTILITIES ENGRING MANAGEMENT STAFF 680
TELEPHONE/COMMUNICATIONS DIV 690
TRANSPORTATION DEPARTMENT 700
PRODUCTION CONTROL DIV 710
EQUIPMENT OPERATIONS DIV 720
EQUIPMENT MAINTENANCE DIV 770
*ADMINISTRATIVE
DATE 1 JULY 1976
APPROVED CAPT B L SARAVIA CEC USN COMMANDING OFFICER
TITLE OF PARENT ORGANIZATION NAVAL FACILITIES ENGINEERING COMMAND
ACTIVITY TITLE NAVY PUBLIC WORKS CENTER, SAN DIEGO, CA 92136
CHART 21
CH 1

APPENDIX K

RPT NO 5C16A COST CENTER STATEMENT (SUMMARY) U.S. NAVY PUBLIC WORKS CENTER ACCOUNTING PERIOD SEPTEMBER

SUMMARY OF PRODUCTION COST CENTERS PERIOD (FROM - TO) 77-10-01 78-09-30 EXHIBIT 6

	CURRENT PERIOD (QUARTER)				FISCAL YEAR TO DATE			
ITEMS	HOURS	ACTUAL COST	BUDGETED COST	% VAR	HOURS	ACTUAL COST	BUDGETED COST	% VAR
DIRECT COST								
MATERIALS		3,865,685.47	3.414.503.00	13-		13,997,683.76	14.853.982.00	6
LABOR	861.313.6	8.552.546.88	7.626.710.00	12-	3.296.567.9	33.164.662.08	30.743.877.00	8-
CONTRACTUAL SERVICES		15,815,127.28	12.417.577.00	27-		52,293,360.79	48.095.323.00	9-
OTHER DIRECT CHARGES		157,300.78-	1.438.856.00-	89-		89,723.30	1.962.176.00-	105-
TOTAL DIRECT CHARGES	861.313.6	28,076,058.85	22.019.934.00	28-	3.296.567.9	99,545,429.93	91.731.006.00	9-
OVERHEAD APPLIED								
PRODUCTION		2.229.164.33	2.009.640.00	11-		8.717.376.78	8.212.413.00	6-
GENERAL ADMINISTRATION		1.894.483.46	1.707.766.00	11-		7.385.740.48	6.956.626.00	6-
TOTAL COST OF PRODUCTION	841.313.6	32,199,706.64	25.737.340.00	25-	3.296.567.9	115,648,547.19	106.902.045.00	9-
LESS: INTER-DEPT TRANS.	20.026.1-	724.904.82-			65.220.6-	2.489.089.39-	1.754.267.00-	42
NET TOTAL	821.287.5	31,474,801.82	25.737.340.00	22-	3.231.347.3	113,159,457.80	105.147.778.00	8-
OVERHEAD COST								
SUPERVISION	59.360.2	800.299.75	828.127.00	3	239.788.7	3.200.380.95	3.122.760.00	2-
OTHER SALARIES AND WAGES	37.470.5	326.581.43	308.968.00	6-	133.887.2	1.203.803.16	1.202.792.00	-
OPERATION DISPATCHER AND SERVICE STATION ATTENDANT	3.085.1	29.440.28	18.516.00	59-	12.257.1	117.092.81	90.786.00	29-
TIME WAITING FOR PARTS/EQUIP	3.392.3	33.643.99	34.686.00	3	11.059.3	107.671.34	93.924.00	15-
STANDBY TIME	746.2	7.286.26	16.010.00	56	4.346.4	47.393.14	38.447.00	23-
OVERTIME PREMIUM PAY		16.149.21				51.203.27		
OVERHEAD WORK PERFORMED BY PRODUCTIVE WORKERS	8.246.7	82.610.36	80.042.00	3-	36.221.9	359.704.08	271.791.00	32-
MISC. PRODUCTION JOBS	77.9	876.43	598.00	47-	610.9	6.423.57	4.675.00	37-
ALLOWED TIME	5.469.2	72.861.64	66.515.00	10-	24.397.7	275.249.80	252.315.00	9-
TRAUMATIC INJURY	2.607.5	25.072.04	31.501.00	20	14.762.5	143.702.63	94.197.00	53-
TELEPHONE SERVICE		25.414.99	25.779.00	1		99.143.46	98.507.00	1-
ELECTRICITY		30.151.39	31.737.00	5		121.201.81	107.903.00	12-
STEAM		6.806.72	13.483.00	64		49.073.28	54.153.00	9
GAS		2.521.69	2.353.00	7-		10.843.30	9.921.00	9-
WATER		2.599.05	3.063.00	15		10.754.66	9.006.00	19-
SEWAGE		1.242.66	1.384.00	10		5.015.04	4.506.00	11-
OTHER UTILITIES		797.24	844.00	6		3.242.84	2.965.00	9-
JANITORIAL SERVICE		26.096.58	21.516.00	21-		90.007.58	91.007.00	1
PEST AND RODENT CONTROL			2.500.00				2.500.00	
USE OF PWC TRANSP. EQUIP	197.0	116.763.21	106.857.00	7-	480.3	380.369.10	373.785.00	2-
REFUSE/GARBAGE COLL AND DISP	52.0	5.399.29	4.200.00	29-	186.5	16.395.57	11.684.00	40-
MATERIALS AND SUPPLIES		157,567.98	149.322.00	6-	8.0	621.334.32	526.546.00	18-
PURCHASE OF OFFICE FURNITURE AND EQUIPMENT		10.200.72	3.628.00	181-		21.949.82	15.421.00	42-
PURCHASE SHOP EQUIPMENT	2.1	41.869.99	78.964.00	47	6.9	178.979.81	165.378.00	8-
EQUIPMENT RENTAL		6.769.89	6.708.00	1-		20.445.93	32.457.00	37
NIF PURCHASED EQUIPMENT		995.54				1.098.74	1.482.00	26
MAINT. AND REPAIR TO BLDGS	4.284.9	80.097.32	195.997.00	59	9.589.6	199.876.50	479.569.00	5C
MAINT AND REPAIR TO GROUNDS	356.3	16.465.90	8.625.00	91-	668.4	22.049.98	21.594.00	2-
REPAIR OF OFFICE FURN./EQUIP							395.00	
MAINT/REPAIR OF SHOP EQUIP.	7.545.0	125.650.82	112.860.00	11-	31.678.9	466.064.69	371.670.00	25-
REARRANGING OF FACILITIES	11.0	162.51	39.742.00	100	107.7	15.276.85	66.348.00	77
EMERGENCY/SERVICE WORK		40.609.75	43.420.00	6	42.0	165.776.06	117.159.00	39-
DEFECTIVE WORK AND SPOILAGE	196.2	6.941.97	5.780.00	20-	1.015.5	24.337.40	20.262.00	20-
TRAVEL		87.983.07	49.739.00	77-		261.575.75	230.349.00	14-
TRAINING	19.337.0	166.332.70	132.551.00	25-	48.175.4	455.080.30	468.506.00	3
PRINTING AND REPRODUCTIONS								
UNALLOCABLE COSTS	8.0-	502.01-				349.71		
COMMAND SAFETY PROGRAM								
INVENTORY ADJUSTMENTS		14.377.20-	27.763.00-	48-		59.765.55-	30.543.00-	96
EXCESS MATERIAL AND MATERIAL LOSSES								
DONATIONS								
BENEFICIAL SUGGESTIONS		17.587.00	11.006.00	60-		63.635.98	44.508.00	2
LABOR DISTRIBUTION VARIANCE						3.271.79		
LABOR ACCELERATION VARIANCE								
STATION SUPPORT COSTS		1.275.00	2.505.00	49		6.617.00	10.971.00	40
ADP SUPPORT COSTS								
CONTRACT ADMIN CREDIT		36.000.00-	23.756.00-	52		90.320.39-	119.137.00-	24-
TOTAL COST CENTER OVERHEAD COSTS INCURRED	152.409.1	2,318,244.16	2.388.007.00	3	567.790.9	8.656.105.06	8.362.259.00	4-
GEN ADMIN OVERHEAD ALLOCATED TO PRODUCTION COST CENTERS		2.582.081.53	1.770.453.00	46-		7.321.663.31	7.030.744.00	4-
TOTAL OVERHEAD COST	152.409.1	4,900,325.69	4.158.460.00	18-	567.790.9	15.977.768.37	15.393.003.00	4-
OVERHEAD VARIANCE ANALYSIS								
BUDGET - ACTUAL	841.313.6				3.296.567.9			
APPLIED - BUDGET	766.300.0				3.128.800.0			
TOTAL VARIANCE	75.013.6				167.767.9			

APPENDIX K

NO 5C14A 500 COST CENTER STATEMENT (DETAIL) U.S. NAVY PUBLIC WORKS CENTER ACCOUNTING PERIOD SEPTEMBER

ION MAINTENANCE DEPT PERIOD (FROM - TO) 77-10-01 78-09-30 EXHIBIT 6

ITEMS	CURRENT PERIOD (QUARTER) HOURS	ACTUAL COST	BUDGETED COST	% VAR	FISCAL YEAR TO DATE HOURS	ACTUAL COST	BUDGETED COST	% VAR
DIRECT COST								
MATERIALS		2,044,711.44	1,497,184.00	37-		8,827,845.50	6,465,905.00	6-
LABOR	418,221.1	4,172,603.29	3,517,817.00	19-	1,600,950.1	15,770,600.45	13,985,372.00	13-
CONTRACTUAL SERVICES		1,796,726.58	600,500.00	199-		4,541,023.78	2,917,536.00	56-
OTHER DIRECT CHARGES		993,514.81-	1,503,800.00-	34-		142,628.70-	2,120,207.00-	93-
TOTAL DIRECT CHARGES	418,221.1	7,020,528.49	4,111,701.00	71-	1,600,930.1	26,998,843.01	21,188,606.00	27-
OVERHEAD APPLIED								
PRODUCTION		982,819.59	845,763.00	16-		3,762,185.78	3,438,043.00	9-
GENERAL ADMINISTRATION		1,184,342.95	1,022,118.00	16-		4,542,229.37	4,154,927.00	9-
TOTAL COST OF PRODUCTION	418,221.1	9,187,689.03	5,979,582.00	54-	1,800,930.1	35,301,258.14	28,781,576.00	23-
LESS: INTER-DEPT TRANS.	8,149.8-	234,854.03-			20,894.5-	705,879.84-	661,332.00-	7
NET TOTAL	410,071.3	8,952,835.00	5,979,582.00	50-	1,580,039.6	34,595,378.30	28,120,244.00	23-
OVERHEAD COST								
SUPERVISION	31,653.7	432,942.78	440,735.00	2	126,508.2	1,713,650.41	1,597,101.00	7-
OTHER SALARIES AND WAGES	6,403.9	68,921.86	71,825.00	7	24,653.9	252,036.18	257,974.00	2
OPERATION DISPATCHER AND SERVICE STATION ATTENDANT								
TIME WAITING FOR PARTS/EQUIP	3,177.9	30,888.01	30,624.00	1-	10,341.1	99,398.27	74,204.00	34-
STANDBY TIME	647.2	6,287.92	3,350.00	88-	1,833.3	18,173.17	14,717.00	23-
OVERTIME PREMIUM PAY		14,615.22				47,490.73		
OVERHEAD WORK PERFORMED BY PRODUCTIVE WORKERS	3,498.8	32,594.35	36,366.00	10	14,785.0	140,147.81	97,991.00	43-
MISC. PRODUCTION JOBS								
ALLOWED TIME	2,521.0	24,728.34	32,538.00	24	12,450.6	F21,271.85	113,064.00	7-
TRAUMATIC INJURY	2,061.5	19,762.35	19,140.00	3-	9,416.5	90,514.93	49,461.00	83-
TELEPHONE SERVICE		7,948.36	8,000.00	1		30,892.55	29,372.00	5-
ELECTRICITY		16,083.39	16,700.00	4		64,307.81	58,413.00	10-
STEAM		1,923.12	5,110.00	62		19,457.04	21,031.00	7
GAS		655.20	566.00	1A-		3,346.70	2,814.00	19-
WATER		1,123.02	1,000.00	12-		4,520.25	3,904.00	16-
SEWAGE		675.36	682.00	1		2,714.11	2,460.00	10-
OTHER UTILITIES		317.24	340.00	7		1,322.84	1,738.00	24
JANITORIAL SERVICE		5,648.32	4,697.00	20-		18,172.83	18,505.00	2
PEST AND RODENT CONTROL								
USE OF PWC TRANSP. EQUIP	135.5	55,300.05	60,000.00	8	295.8	186,679.15	174,000.00	7-
REFUSE/GARBAGE COLL AND DISP	21.5	4,834.47	3,400.00	42-	66.5	14,348.48	8,535.00	68-
MATERIALS AND SUPPLIES		106,452.66	109,000.00	2		407,518.91	356,500.00	14-
PURCHASE OF OFFICE FURNITURE AND EQUIPMENT								
PURCHASE SHOP EQUIPMENT		27,617.39	36,000.00	23	2.8	100,459.84	76,500.00	31-
EQUIPMENT RENTAL		2,459.78	3,725.00	34		11,574.43	14,900.00	22
SIF PURCHASED EQUIPMENT								
MAINT. AND REPAIR TO BLDGS	1,993.2	46,883.20	88,481.00	47	4,284.7	99,370.42	212,681.00	53
MAINT AND REPAIR TO GROUNDS	305.3	15,452.91	625.00	2372-	578.9	20,333.90	12,715.00	60-
REPAIR OF OFFICE FURN./EQUIP								
MAINT/REPAIR OF SHOP EQUIP.	4,412.3	70,501.94	68,317.00	3-	16,859.8	224,389.39	228,958.00	2
REARRANGING OF FACILITIES			32,000.00		315.2	10,006.10	38,000.00	74
EMERGENCY/SERVICE WORK		22,007.67	22,000.00			74,646.30	54,500.00	37-
DEFECTIVE WORK AND SPOILAGE								
TRAVEL		7,451.79	3,100.00	140-		20,049.04	12,400.00	62-
TRAINING	11,676.1	92,058.47	55,670.00	65-	28,715.0	226,920.84	197,396.00	15-
PRINTING AND REPRODUCTIONS								
UNALLOCABLE COSTS								
COMMAND SAFETY PROGRAM								
INVENTORY ADJUSTMENTS		2,444.33				749.85		
EXCESS MATERIAL AND MATERIAL LOSSES								
DONATIONS								
BENEFICIAL SUGGESTIONS		7,683.00	5,000.00	52-		20,327.00	18,500.00	10-
LABOR DISTRIBUTION VARIANCE						522.46		
LABOR ACCELERATION VARIANCE								
STATION SUPPORT COSTS		882.00	881.00			3,524.00	6,335.00	22
ADP SUPPORT COSTS								
CONTRACT ADMIN CREDIT								
TOTAL COST CENTER OVERHEAD COSTS INCURRED	68,507.9	1,125,078.92	1,159,872.00	3	(251,097.3	4,048,843.39	3,752,269.00	8-
GEN ADMIN OVERHEAD ALLOCATED TO PRODUCTION COST CENTERS		1,347,459.24	1,054,989.00	47-		4,427,148.46	4,152,303.00	7-
TOTAL OVERHEAD COST	68,507.9	2,872,538.18	2,214,861.00	21-	251,097.3	8,475,989.85	7,904,572.00	7-
(OVER) UNDER APPLIED OVERHEAD:								
PRODUCTION		142,257.53	314,109.00	55		286,657.83	314,226.00	9
GENERAL ADMINISTRATION		363,116.29	32,871.00	1005-		115,082.91-	2,624.00-	4286
TOTAL (OVER) UNDER APPLIED OVERHEAD		505,373.82	346,980.00	48-		171,574.72	311,602.00	45
OVERHEAD RATE PER D/L HOUR								
ACTUAL: PRODUCTION		2.89	3.22			2.53	2.56	
GENERAL ADMIN		3.70	2.93			2.77	2.84	
TOTAL		8.39	6.15			3.30	5.40	
APPLIED: PRODUCTION		2.35	2.35			2.33	2.33	
GENERAL ADMIN		2.83	2.84			2.84	2.84	
TOTAL		3.18	5.19			5.19	5.19	
OVERHEAD VARIANCE ANALYSIS								
BUDGET - ACTUAL	418,221.1	457,675.16-			1,398,326.1	571,417.85-		
APPLIED - BUDGET	359,900.0	47,698.46-	346,980.00-		1,463,000.0	399,843.13	311,602.00-	
TOTAL VARIANCE	58,321.1	505,373.62-	346,980.00-		135,326.1	171,374.72-	311,602.00-	

APPENDIX K

IIO SC14A   620 COST CENTER STATEMENT (DETAIL) U.S. NAVY PUBLIC WORKS CENTER   ACCOUNTING PERIOD SEPTEMBER

ATION UTILITIES DEPT   PERIOD (FROM - TO) 77-10-01   78-09-30   EXHIBIT 6

ITEMS	CURRENT PERIOD (QUARTER) HOURS	ACTUAL COST	BUDGETED COST	% VAR	FISCAL YEAR TO DATE HOURS	ACTUAL COST	BUDGETED COST	% VAR
ICT COST								
ATERIALS		341,660.16	967,556.00	65		2,357,975.68	3,967,140.00	41
ABOR	102,366.4	1,097,169.77	1,137,301.00	4	434,944.9	4,609,804.10	4,680,156.00	2
ONTRACTUAL SERVICES		10,984,867.69	9,383,500.00	17-		37,975,214.25	36,266,282.00	5-
THER DIRECT CHARGES		761,382.35	6,200.00			60,440.33	23,997.00	152-
TOTAL DIRECT CHARGES	102,366.4	13,185,079.97	11,494,557.00	15-	434,944.9	45,003,434.36	44,937,575.00	
VERHEAD APPLIED								
PRODUCTION		261,034.32	281,009.00	7		1,109,109.52	1,163,050.00	5
GENERAL ADMINISTRATION		193,485.49	208,279.00	7		820,905.01	862,034.00	5
TOTAL COST OF PRODUCTION	102,366.4	13,639,599.78	11,983,845.00	14-	434,944.9	48,933,448.89	46,962,659.00	
LESS) INTER-DEPT TRANS.	.6-	52,847.21-			17.1-	240,841.35-	164,444.00-	46
NET TOTAL	102,365.8	13,586,752.57	11,983,845.00	13-	434,927.8	46,692,607.54	46,798,215.00	
RHEAD COST								
UPERVISION	6,433.0	89,491.38	94,304.00	5	25,086.7	347,550.28	377,443.00	8
THER SALARIES AND WAGES	6,078.5	53,962.04	57,417.00	6	22,911.6	211,872.53	211,036.00	
PERATION DISPATCHER AND								
SERVICE STATION ATTENDANT								
IME WAITING FOR PARTS/EQUIP							745.00	
TANDBY TIME							745.00	
VERTIME PREMIUM PAY								
VERHEAD WORK PERFORMED								
BY PRODUCTIVE WORKERS	448.7	4,879.69	5,117.00	5	1,852.1	19,740.32	17,810.00	11-
ISC. PRODUCTION JOBS								
LLOWED TIME	119.0	1,241.26			350.8	3,680.64	4,125.00	11
RAUMATIC INJURY	24.0	244.89	3,159.00	92	1,630.5	15,830.06	8,626.00	84-
ELEPHONE SERVICE		3,255.91	3,690.00	12		13,904.88	15,000.00	7
LECTRICITY		1,176.00	1,191.00	1		5,192.00	4,860.00	7-
TEAM		64.80	460.00	86		1,461.60	1,866.00	22
AS		94.50				378.00		
ATER		70.47	70.00	1-		281.88	175.00	61-
EWAGE		52.92	55.00	4		211.68	132.00	60-
THER UTILITIES								
ANITORIAL SERVICE		2,443.96	2,100.00	27-		9,980.69	7,378.00	35-
EST AND RODENT CONTROL								
SE OF PWC TRANSP. EQUIP		53,111.45	20,500.00	62-	25.0	94,415.54	84,852.00	9-
EFUSE/GARBAGE COLL AND DISP	11.0	207.90			32.0	599.65		
ATERIALS AND SUPPLIES		5,670.55	2,500.00	127-		11,794.08	9,664.00	22-
URCHASE OF OFFICE								
FURNITURE AND EQUIPMENT		3,072.94	1,230.00	150-		10,249.34	5,000.00	105-
URCHASE SHOP EQUIPMENT		1,734.16	5,000.00	65		21,159.52	13,082.00	62-
QUIPMENT RENTAL							1,132.00	
IF PURCHASED EQUIPMENT		995.54				1,098.74	1,482.00	26
AINT. AND REPAIR TO BLDGS	83.0	1,995.60	47,925.00	96	83.0	1,995.60	63,462.00	97
AINT AND REPAIR TO GROUNDS								
EPAIR OF OFFICE FURN./EQUIP							148.00	
AINT/REPAIR OF SHOP EQUIP.	137.2	2,512.96	2,156.00	17-	587.2	8,447.25	8,135.00	4-
EARRANGING OF FACILITIES			5,000.00				5,000.00	
MERGENCY/SERVICE WORK		3,035.72	3,000.00	1-		14,072.55	8,278.00	70-
EFECTIVE WORK AND SPOILAGE							1,497.00	
TRAVEL		3,510.07	500.00	602-		4,591.13	5,238.00	12
TRAINING	1,588.5	11,742.84	18,790.00	38	4,470.0	45,406.17	72,046.00	37
PRINTING AND REPRODUCTIONS								
NALLOCABLE COSTS								
OMMAND SAFETY PROGRAM								
INVENTORY ADJUSTMENTS		112.00-						
EXCESS MATERIAL AND								
MATERIAL LOSSES								
ONATIONS								
ENEFICIAL SUGGESTIONS		1,800.00	1,500.00	20-		3,355.00	5,958.00	44
LABOR DISTRIBUTION VARIANCE						298.51		
LABOR ACCELERATION VARIANCE								
STATION SUPPORT COSTS								
ADP SUPPORT COSTS								
CONTRACT ADMIN CREDIT								
TOTAL COST CENTER								
OVERHEAD COSTS INCURRED	14,942.9	226,475.59	275,664.00	18	57,028.9	847,587.64	937,315.00	10
EN ADMIN OVERHEAD ALLOCATED								
TO PRODUCTION COST CENTERS		295,363.70	219,383.00	35-		844,487.38	889,483.00	5
TOTAL OVERHEAD COST	14,942.9	521,839.29	495,047.00	5-	57,028.9	1,692,075.02	1,826,798.00	7
VER) UNDER APPLIED OVERHEAD:								
PRODUCTION		34,558.73-	5,345.00-	547		261,721.88-	225,735.00-	16
GENERAL ADMINISTRATION		101,878.21	11,104.00	817-		23,532.37	27,449.00	14
TOTAL (OVER) UNDER								
APPLIED OVERHEAD		67,319.48	5,759.00	1069-		237,939.51-	198,286.00-	20
RHEAD RATE PER O/L HOUR								
ACTUAL: PRODUCTION		2.21	2.50			1.95	2.06	
GENERAL ADMIN		2.89	1.99			1.94	1.95	
TOTAL		5.10	4.49			3.89	4.01	
APPLIED: PRODUCTION		2.55	2.55			2.55	2.55	
GENERAL ADMIN		1.89	1.89			1.89	1.89	
TOTAL		4.44	4.44			4.44	4.44	
RHEAD VARIANCE ANALYSIS								
BUDGET - ACTUAL	102,366.4	26,792.29-			434,944.9	134,722.98		
APPLIED - BUDGET	110,200.0	40,527.19-	5,759.00-		456,100.0	103,216.53	198,286.00	
TOTAL VARIANCE	7,833.6-	67,319.46-	5,759.00-		21,155.1-	237,939.51	198,286.00	

APPENDIX K

NO 9C14A 690 COST CENTER STATEMENT (DETAIL) U.S. NAVY PUBLIC WORKS CENTER ACCOUNTING PERIOD SEPTEMBER

PERIOD (FROM - TO) 77-10-01 78-09-30 EXHIBIT 6

(UN TELEPHONE/COMM DIV

ITEMS	CURRENT PERIOD (QUARTER) HOURS	ACTUAL COST	BUDGETED COST	% VAR	FISCAL YEAR TO DATE HOURS	ACTUAL COST	BUDGETED COST	% VAR
						57.75		
DIRECT COST					57,160.0	338,615.29	314,774.00	7-
MATERIALS	13,999.1	83,110.17	82,083.00	1-		3,613,791.05	4,132,466.00	13
LABOR		961,007.11	1,062,200.00	10		64.49	1,529.00	96
CONTRACTUAL SERVICES		44.27	500.00	91	57,160.0	3,952,528.58	4,450,769.00	11
OTHER DIRECT CHARGES		1,044,161.55	1,144,783.00	9				
TOTAL DIRECT CHARGES	13,999.1							
						170,336.80	163,299.00	4-
OVERHEAD APPLIED		41,117.32	42,017.00	1		67,681.77	64,669.00	5-
PRODUCTION		16,518.94	16,639.00	1		4,190,547.15	4,678,737.00	10
GENERAL ADMINISTRATION	13,999.1	1,102,397.01	1,203,439.00	8	57,160.0	180,033.06-	132,405.00-	34
TOTAL COST OF PRODUCTION		49,513.69-			57,160.0	4,010,514.09	4,546,332.00	12
LESS: INTER-DEPT TRANS.	13,999.1	1,052,884.12	1,203,439.00	13				
NET TOTAL								
OVERHEAD COST	3,333.6	19,886.51	17,651.00	13-	9,245.8	77,436.58	73,043.00	6-
SUPERVISION	1,347.5	8,591.14	7,148.00	11-	5,391.0	33,125.73	32,005.00	4-
OTHER SALARIES AND WAGES								
OPERATION DISPATCHER AND								
SERVICE STATION ATTENDANT							116.00	
TIME WAITING FOR PARTS/EQUIP			29.00					
STANDBY TIME								
OVERTIME PREMIUM PAY								
OVERHEAD WORK PERFORMED								
BY PRODUCTIVE WORKERS					53.2	309.16	351.00	12
MISC. PRODUCTION JOBS	13.5	81.66	87.00	6	6.0	39.32	2,068.00	98
ALLOWED TIME			516.00			4,533.91	4,500.00	1-
TRAUMATIC INJURY		1,114.88	1,111.00			480.00	520.00	8
TELEPHONE SERVICE		120.00	129.00	7		3,094.44	3,420.00	10
ELECTRICITY			531.00			67.30	67.00	
STEAM		16.80	14.00	20-		179.28	125.00	43-
GAS		44.82	32.00	40-		108.36	109.00	1
WATER		37.09	25.00	8-				
SEWAGE						2,396.12	2,777.00	14
OTHER UTILITIES		852.76	650.00	31-				
JANITORIAL SERVICE						1,504.46	1,442.00	4-
PEST AND RODENT CONTROL		318.45	350.00	38				
USE OF PWC TRANSP. EQUIP						1,786.33	1,900.00	6
REFUSE/GARBAGE COLL AND DISP		601.54	233.00	171-				
MATERIALS AND SUPPLIES						5,359.30	765.00	601-
PURCHASE OF OFFICE		4,717.00	188.00	2409-			130.00	
FURNITURE AND EQUIPMENT								
PURCHASE SHOP EQUIPMENT								
EQUIPMENT RENTAL					35.0	735.87	32,546.00	98
NIF PURCHASED EQUIPMENT			30,966.00					
MAINT. AND REPAIR TO BLDGS							367.00	
MAINT AND REPAIR TO GROUNDS							750.00	
REPAIR OF OFFICE FURN./EQUIP			173.00					
MAINT/REPAIR OF SHOP EQUIP.						86.25	619.00	86
REARRANGING OF FACILITIES			225.00					
EMERGENCY/SERVICE WORK						826.50	903.00	8
DEFECTIVE WORK AND SPOILAGE		360.57	150.00	73-		7,893.51	11,340.00	30
TRAVEL	560.5	3,468.62	4,335.00	20	1,089.0			
TRAINING						116.33		
PRINTING AND REPRODUCTIONS								
UNALLOCABLE COSTS								
COMMAND SAFETY PROGRAM								
INVENTORY ADJUSTMENTS								
EXCESS MATERIAL AND								
MATERIAL LOSSES						1,100.00	1,505.00	27
DONATIONS		600.00	375.00	60-				
BENEFICIAL SUGGESTIONS								
LABOR DISTRIBUTION VARIANCE								
LABOR ACCELERATION VARIANCE								
STATION SUPPORT COSTS								
ADP SUPPORT COSTS								
CONTRACT ADMIN CREDIT								
TOTAL COST CENTER								
OVERHEAD COSTS INCURRED	4,255.1	40,601.35	65,483.00	38	15,803.0	141,176.45	171,247.00	18
GEN ADMIN OVERHEAD ALLOCATED								
TO PRODUCTION COST CENTERS		17,305.73	17,197.00	1-		68,100.63	65,592.00	4-
TOTAL OVERHEAD COST	4,255.1	57,907.08	82,480.00	30	15,803.0	209,277.08	336,439.00	12
(OVER) UNDER APPLIED OVERHEAD:						39,160.35-	7,948.00	467
PRODUCTION		1,115.97-	23,466.00	105		418.86	923.00	55
GENERAL ADMINISTRATION		788.79	558.00	41-				
TOTAL (OVER) UNDER						38,741.49-	8,871.00	424
APPLIED OVERHEAD		329.18-	24,024.00	101				
OVERHEAD RATE PER D/L HOUR						2.47	3.13	
ACTUAL: PRODUCTION		3.90	4.64			1.19	1.20	
GENERAL ADMIN		1.24	1.33			3.66	4.33	
TOTAL		6.14	5.86					
APPLIED: PRODUCTION		2.98	3.98			3.98	3.98	
GENERAL ADMIN		1.18	1.18			1.18	1.18	
TOTAL		4.16	4.16			4.16	4.16	
OVERHEAD VARIANCE ANALYSIS	13,999.1	24,772.92			57,160.0	27,561.92		
BUDGET - ACTUAL	14,100.0	24,443.74-	24,024.00-		54,800.0	1,179.57	8,871.00-	
APPLIED - BUDGET	100.9-	129.18	24,024.00-		3,360.0	38,741.49	8,871.00-	
TOTAL VARIANCE								

APPENDIX' K

FI NO SC14A 720 COST CENTER STATEMENT (DETAIL) U.S. NAVY PUBLIC WORKS CENTER ACCOUNTING PERIOD SEPTEMBER

OCATION TRANSPORTATION OPER PERIOD (FROM - TO) 77-10-01 . 78-09-30 EXHIBIT 6

ITEMS	CURRENT PERIOD (QUARTER) HOURS	ACTUAL COST	BUDGETED COST	% VAR	FISCAL YEAR TO DATE HOURS	ACTUAL COST	BUDGETED COST	% VAR
DIRECT COST								
MATERIALS		434,677.69	255,000.00	70-		1,512,487.98	1,428,336.00	6-
LABOR	A 101,859.9	1,054,290.30	1,008,731.00	5-	403,848.0	4,174,851.67	4,051,544.00	3-
CONTRACTUAL SERVICES		723,218.89	290,000.00	149-		1,707,969.29	1,367,754.00	25-
OTHER DIRECT CHARGES		28,570.56	4,800.00	495-		42,885.04	4,620.00	828-
TOTAL DIRECT CHARGES	101,859.9	2,240,757.44	1,558,531.00	44-	405,868.0	7,438,193.98	6,852,254.00	9-
OVERHEAD APPLIED								
PRODUCTION		230,203.37	229,388.00			917,261.68	920,040.00	
GENERAL ADMINISTRATION		192,351.81	191,837.00			770,060.23	769,425.00	
TOTAL COST OF PRODUCTION	101,859.9	2,663,312.62	1,979,756.00	35-	405,868.0	9,125,515.89	8,541,719.00	7-
LESS: INTER-DEPT TRANS.	9,932.0-	306,140.54-			35,185.6-	1,031,997.28-	675,214.00-	53
NET TOTAL	91,927.9	2,357,172.08	1,979,756.00	19-	370,682.4	8,093,518.61	7,866,505.00	3-
OVERHEAD COST								
SUPERVISION	6,927.6	90,008.04	88,780.00	1-	27,713.3	358,326.19	365,423.00	2
OTHER SALARIES AND WAGES	5,073.5	40,751.26	35,378.00	15-	18,690.9	154,640.04	151,886.00	2-
OPERATION DISPATCHER AND SERVICE STATION ATTENDANT	3,085.1	29,440.28	18,516.00	59-	12,241.1	116,944.61	90,786.00	29-
TIME WAITING FOR PARTS/EQUIP	166.0	2,213.91	3,325.00	33	411.6	5,337.78	9,807.00	46
STANDBY TIME	98.0	987.76	12,513.00	92	2,459.5	28,718.09	18,640.00	54-
OVERTIME PREMIUM PAY		1,286.37				2,783.93		
OVERHEAD WORK PERFORMED BY PRODUCTIVE WORKERS	359.3	398.94-	7,793.00	105	4,567.6	42,932.65	23,253.00	85-
MISC. PRODUCTION JOBS	48.0	498.94	97.00	414-	75.8	769.11	1,253.00	39
ALLOWED TIME	355.9	3,520.80	2,218.00	59-	1,492.8	14,628.49	16,648.00	12
TRAUMATIC INJURY	391.0	3,678.86	2,904.00	27-	1,890.0	18,119.23	11,564.00	57-
TELEPHONE SERVICE		5,390.20	4,326.00	25-		18,824.62	15,079.00	25-
ELECTRICITY		2,224.00	2,400.00	7		9,168.00	8,932.00	3-
STEAM		864.00	2,368.00	44		7,790.40	9,432.00	17
GAS		23.10	24.00	4		92.40	24.00	285-
WATER		377.97	351.00	8-		1,466.52	1,020.00	44-
SEWAGE		208.53	220.00	5		798.84	527.00	52-
OTHER UTILITIES								
JANITORIAL SERVICE		3,793.37	2,475.00	53-		9,382.10	12,644.00	26
PEST AND RODENT CONTROL								
USE OF PWC TRANSP. EQUIP	43.5	6,049.32	6,400.00	5	75.0	24,349.82	19,896.00	22-
REFUSE/GARBAGE COLL AND DISP								
MATERIALS AND SUPPLIES		14,084.74	2,686.00	424-		28,491.65	12,296.00	132-
PURCHASE OF OFFICE FURNITURE AND EQUIPMENT		241.50	1,000.00	76		1,941.50	2,928.00	34
PURCHASE SHOP EQUIPMENT		1,409.07				19,340.04	13,543.00	43-
EQUIPMENT RENTAL		1,942.76	1,333.00	46-		4,336.50	9,833.00	56
NIF PURCHASED EQUIPMENT								
MAINT. AND REPAIR TO BLDGS	989.5	21,120.84	4,960.00	326-	1,647.3	34,001.14	98,669.00	66
MAINT AND REPAIR TO GROUNDS	39.0	701.20	8,000.00	91	75.0	1,340.64	8,879.00	85
REPAIR OF OFFICE FURN./EQUIP								
MAINT/REPAIR OF SHOP EQUIP.	440.5	10,026.07	8,000.00	25-	2,002.9	30,079.13	16,233.00	85-
REARRANGING OF FACILITIES			1,280.00		267.0	4,769.08	12,730.00	63
EMERGENCY/SERVICE WORK		5,105.98	8,700.00	41	42.0	25,733.22	17,314.00	49-
DEFECTIVE WORK AND SPOILAGE	52.5	975.13	1,786.00	45	52.5	995.13	5,219.00	81
TRAVEL		4,300.00	1,380.00	212-		5,698.98	4,159.00	37-
TRAINING	1,065.1	19,769.83	2,002.00	888-	2,721.6	36,678.41	29,470.00	24-
PRINTING AND REPRODUCTIONS								
UNALLOCABLE COSTS		446.13-				270.43-		
COMMAND SAFETY PROGRAM								
INVENTORY ADJUSTMENTS								
EXCESS MATERIAL AND MATERIAL LOSSES								
DONATIONS								
BENEFICIAL SUGGESTIONS		332.00	1,092.00	70		7,241.00	7,237.00	
LABOR DISTRIBUTION VARIANCE						497.72		
LABOR ACCELERATION VARIANCE								
STATION SUPPORT COSTS								
ADP SUPPORT COSTS								
CONTRACT ADMIN CREDIT								
TOTAL COST CENTER OVERHEAD COSTS INCURRED	19,134.5	270,480.76	232,267.00	16-	76,425.9	1,015,946.53	995,424.00	2-
GEN ADMIN OVERHEAD ALLOCATED TO PRODUCTION COST CENTERS		290,006.26	202,064.00	44-		791,084.13	795,020.00	
TOTAL OVERHEAD COST	19,134.5	560,487.02	434,331.00	29-	76,425.9	1,807,030.66	1,790,444.00	1-
(OVER) UNDER APPLIED OVERHEAD:								
PRODUCTION		40,277.39	2,879.00	1299-		98,684.85	75,384.00	31-
GENERAL ADMINISTRATION		97,654.45	10,227.00	855-		21,023.90	25,595.00	18
TOTAL (OVER) UNDER APPLIED OVERHEAD		137,931.84	13,106.00	952-		119,708.75	100,979.00	19-
OVERHEAD RATE PER D/L HOUR								
ACTUAL: PRODUCTION		2.66	2.29			2.50	2.45	
GENERAL ADMIN		2.85	1.99			1.95	1.95	
TOTAL		5.51	4.28			4.45	4.40	
APPLIED: PRODUCTION		2.26	2.26			2.26	2.26	
GENERAL ADMIN		1.89	1.89			1.90	1.89	
TOTAL		4.15	4.15			4.16	4.15	
OVERHEAD VARIANCE ANALYSIS								
BUDGET - ACTUAL	101,859.9	128,156.02-			405,868.0	16,586.66-		
APPLIED - BUDGET	101,500.0	11,775.82-	13,106.00-		407,100.0	103,122.09-	100,979.00-	
TOTAL VARIANCE	359.9	137,931.84-	13,106.00-		1,232.0-	119,708.75-	100,979.00-	

APPENDIX L

Coordinating Board, Texas College and University System

RECOMMENDED FORMULA
FOR
BUILDING MAINTENANCE
Public Senior Colleges and Universities
1979-81 Biennium

For each year of the biennium maintenance cost factors times building replacement costs equals dollar request for Building Maintenance

A. Maintenance cost factors are designated as follows (factors expressed as percentage figures):

	Wood-Frame Construction 1/	Masonry-Wood Construction 2/	Masonry-Concrete Construction 3/
Air Conditioned	1.90	1.45	1.25
Non-Air Conditioned	1.75	1.30	1.10

B. Building replacement cost shall be determined by applying the factors for the specific classes of construction, as shown on Markel's Handy Appraisal Chart 4/ to the original construction costs of each educational, general and service building. Buildings to be included are as follows:

Fiscal Year 1980

Include buildings which will be completed and carried on the books of the institution as of August 31, 1980. The portion of the total 1980 request for Building Maintenance for buildings to be accepted between September 1, 1979 and August 31, 1980 should be clearly shown as a subtotal. The portion of the total 1980 request for Building Maintenance on buildings completed between September 1, 1979 and August 31, 1980 should be multiplied by a factor of X/12 where X equals the number of months during fiscal year 1980 that Building Maintenance will be required on such new buildings.

Fiscal Year 1981

Include buildings which will be completed and carried on the books of the institution as of August 31, 1981. The portion of the total 1981 request for Building Maintenance for buildings to be accepted between September 1, 1980 and August 31, 1981 should be clearly shown as a subtotal. The portion of the total 1981 request for Building Maintenance on buildings completed between September 1, 1980 and August 31, 1981 should be multiplied by a factor of X/12 where X equals the number of months during fiscal year 1981 that Building Maintenance will be required on such new buildings.

1/ Designated as "Frame" on Markel's Handy Appraisal Chart.
2/ Designated as "Semi-Fireproof" on Markel's Handy Appraisal Chart.
3/ Designated as "Fireproof" on Markel's Handy Appraisal Chart.
4/ Published by Markel Appraisal Chart Company, Cincinnati 2, Ohio as of January and July each year. Use the January 1978 issue for each budget submission.

APPENDIX L

Coordinating Board, Texas College and University System

RECOMMENDED FORMULA
FOR
GROUNDS MAINTENANCE
Public Senior Colleges and Universities
1979-81 Biennium

For each year of the biennium:

SW (.70P + 122L + .50E)

Definitions of terms used in the formula:

1. SW is the average hourly earnings for services (adjusted) for January, 1978 as shown in the Survey of Current Business published by the Bureau of Economic Analysis of the U.S. Department of Commerce.

2. P is the total linear feet of perimeter of all campus buildings including academic, office, service, administration, dormitories, etc. For fiscal year 1980 include all buildings which will be completed and carried on the books of the institution as of August 31, 1979. For fiscal year 1981 include all buildings which will be completed and carried on the books of the institution as of August 31, 1980.

3. L is the total number of acres of lawns and regularly maintained areas (malls, flower beds, parking lots, sidewalks, streets, etc.). Exclude all buildings, street areas, and areas covered under Organized Activities (i.e. college farms). For fiscal year 1980 include applicable acres as of August 31, 1979. For fiscal year 1981 include applicable acres as of August 31, 1980.

4. E is the Fall Semester 1978 Head-Count Enrollment.

APPENDIX L

Coordinating Board, Texas College and University System

RECOMMENDED FORMULA
FOR
CUSTODIAL SERVICES
Public Senior Colleges and Universities
1979-81 Biennium

For Fiscal Year 1980:

$$SW \times \frac{GSF}{22,400} \times 2080 \times 1.2$$

For Fiscal Year 1981:

$$SW \times I \times \frac{GSF}{22,400} \times 2080 \times 1.2$$

Definitions of terms used in the formula:

1. SW is the average hourly earnings for services (adjusted) for January, 1978, as shown in the Survey of Current Business published by the Bureau of Economic Analysis of the U.S. Department of Commerce.

2. I represents labor and material inflation factor. For fiscal year 1981 this factor is 1.064.

3. GSF is gross square feet (outside dimensions) of educational, general, and service buildings.

   For fiscal year 1980, include buildings completed and carried on the books of the institution as of August 31, 1979, plus the gross area of such similar buildings completed between September 1, 1979, and August 31, 1980 times a factor of X/12 where X equals the number of months during fiscal year 1980 that Custodial Services will be required in such new buildings. The portion of the total 1980 request for Custodial Services for new buildings to be occupied between September 1, 1979 and August 31, 1980 should be clearly shown as a subtotal.

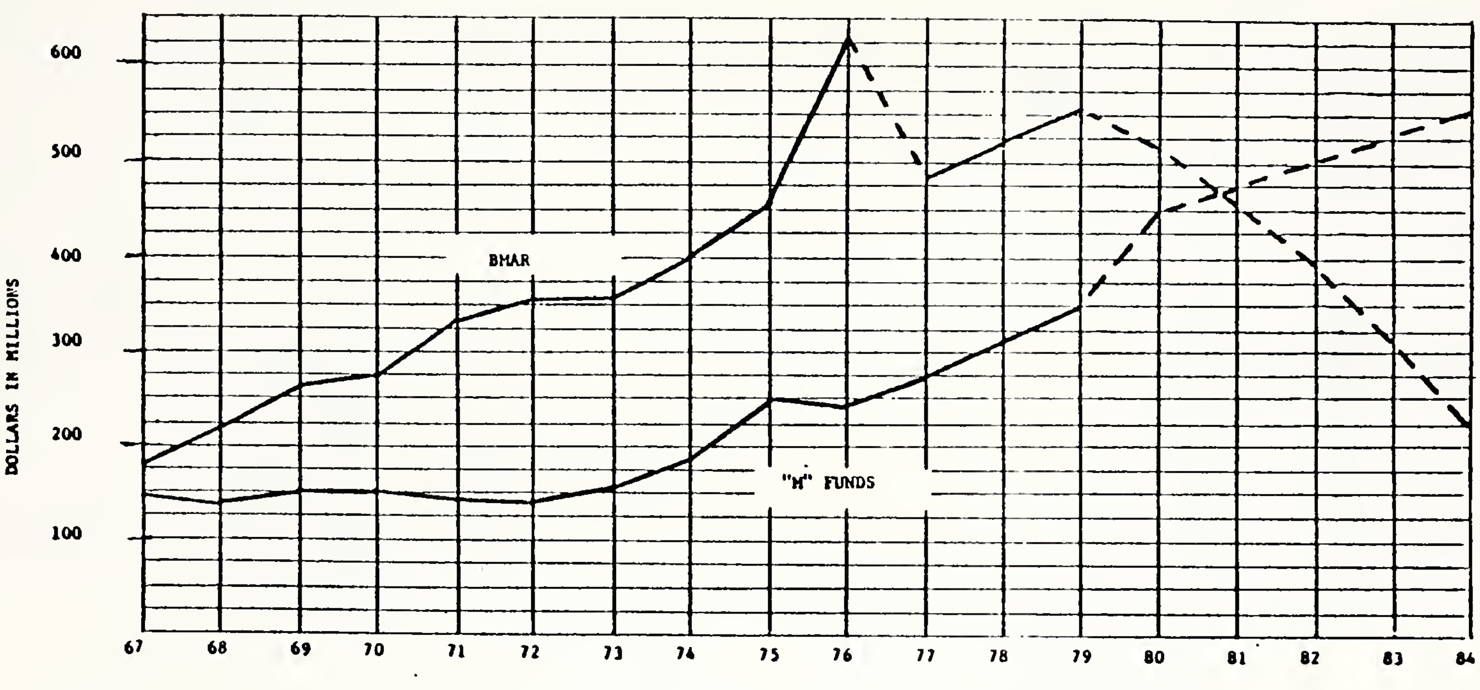
   For fiscal year 1981, include buildings completed and carried on the books of the institution as of August 31, 1980, plus the gross area of such similar buildings completed between September 1, 1980, and August 31, 1981 times a factor of X/12 where X equals the number of months during fiscal year 1981 that Custodial Services will be required in such new buildings. The portion of the total 1981 request for Custodial Services for new buildings to be occupied between September 1, 1980 and August 31, 1981 should be clearly shown as a subtotal.

NOTE: For purposes of the Custodial Services formula "educational, general, and service buildings" do not include auxiliary enterprise buildings, any buildings not requiring Custodial Services, or any buildings where Custodial Services are performed by persons other than those whose salaries are paid out of funds budgeted for Custodial Services.

APPENDIX M

FIGURES 1 through 5

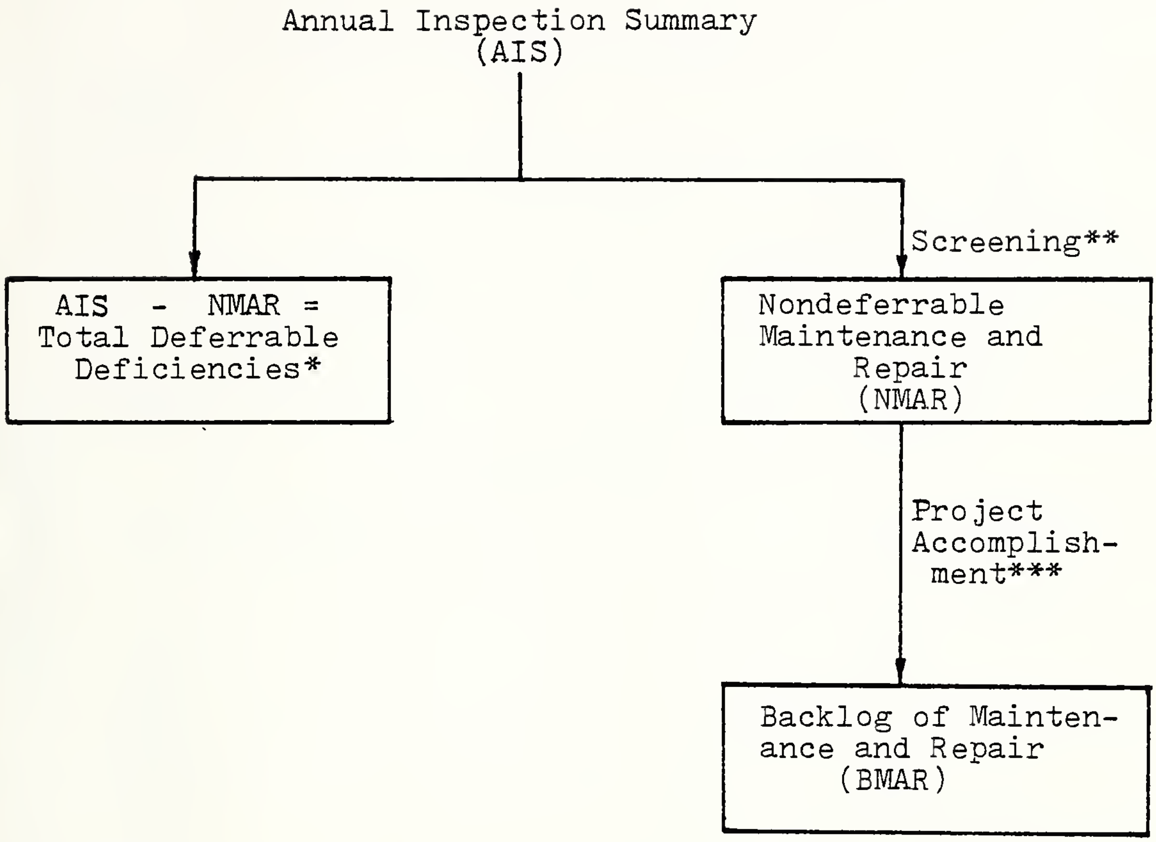
"M" FUNDING & BMAR
O&M NAVY



NOTE: Prior to FY77 backlog was the total of all AIS deficiencies. In FY77 the backlog was purged of all items not requiring correction in the current year.

FY67 - FY77: Actual
FY78 & FY79: Budget Estimates
FY80 - FY84: OP-44 Proposed POM 80 Issue

Figure 1



* These deficiencies if left uncorrected are likely to become NMAR.

** Screening is accomplished first by the activity Commanding Officer then the major claimant.

*** Major claimants have a strong voice, via the funding allocation process, in deciding which projects will be accomplished

Figure 2

BACKLOG OF ESSENTIAL
MAINTENANCE & REPAIR
(BEMAR)
TRENDS (77)

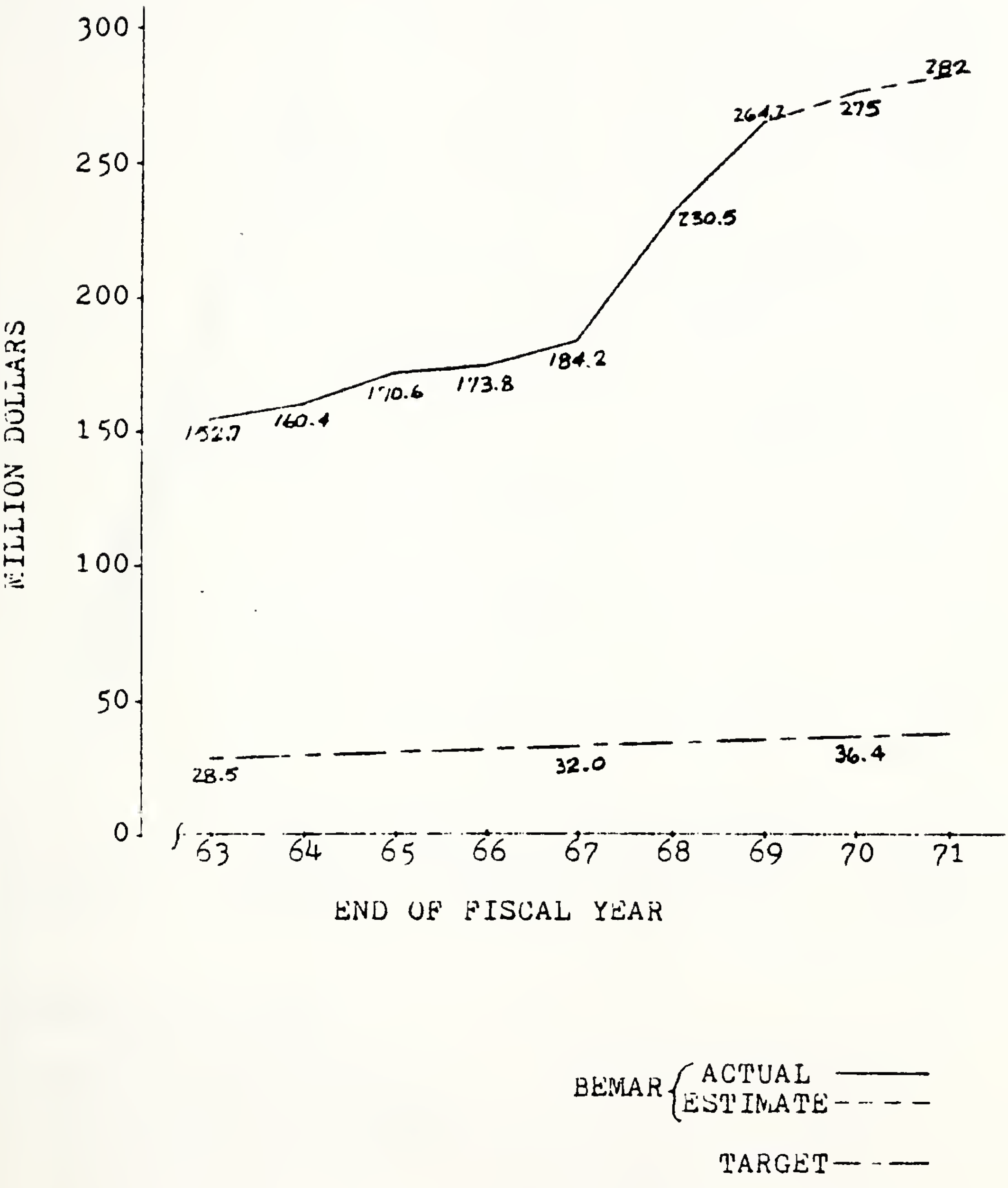


Figure 3

NIF

NAVY PUBLIC WORKS CENTERS

BMAR GROWTH

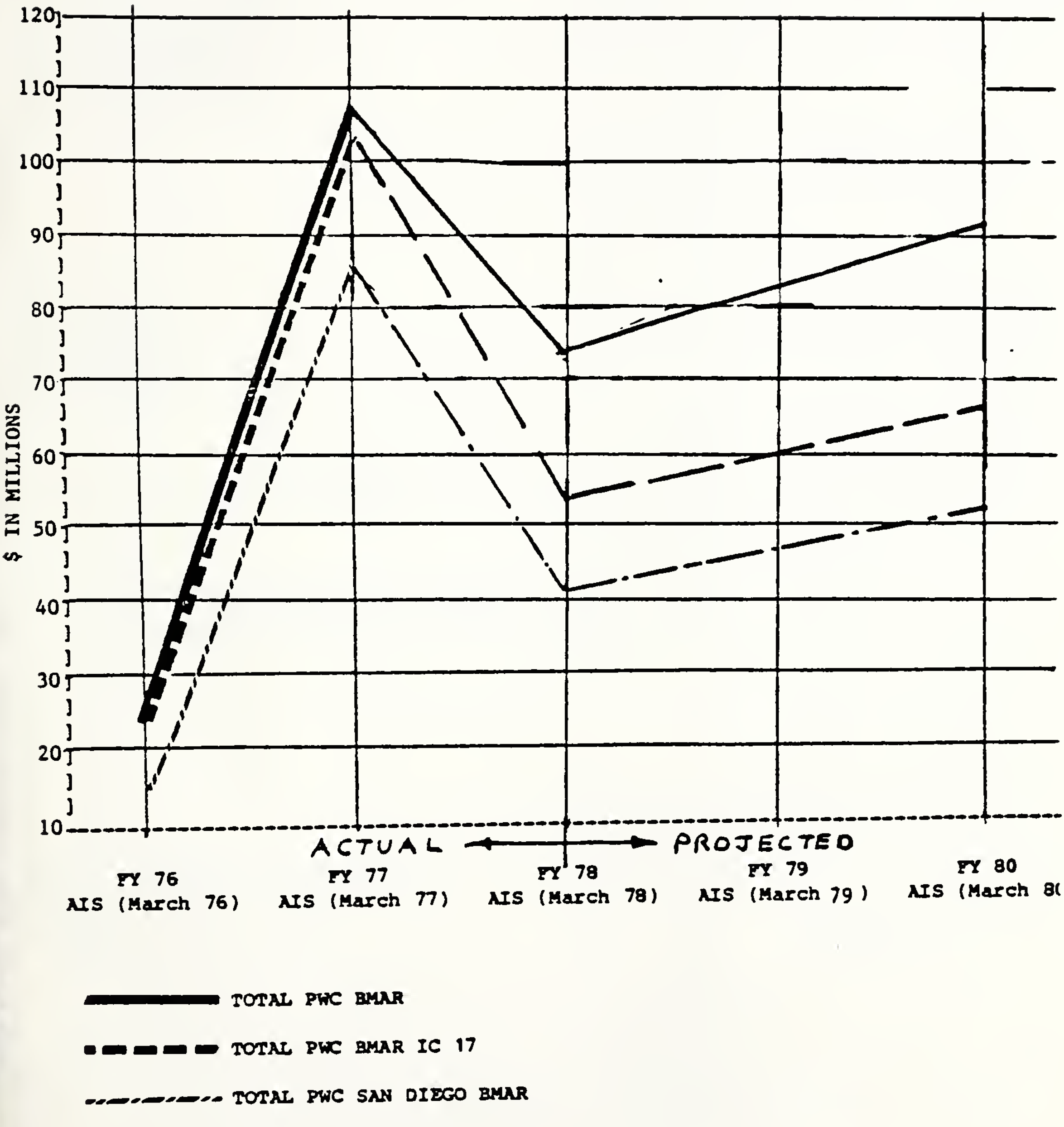
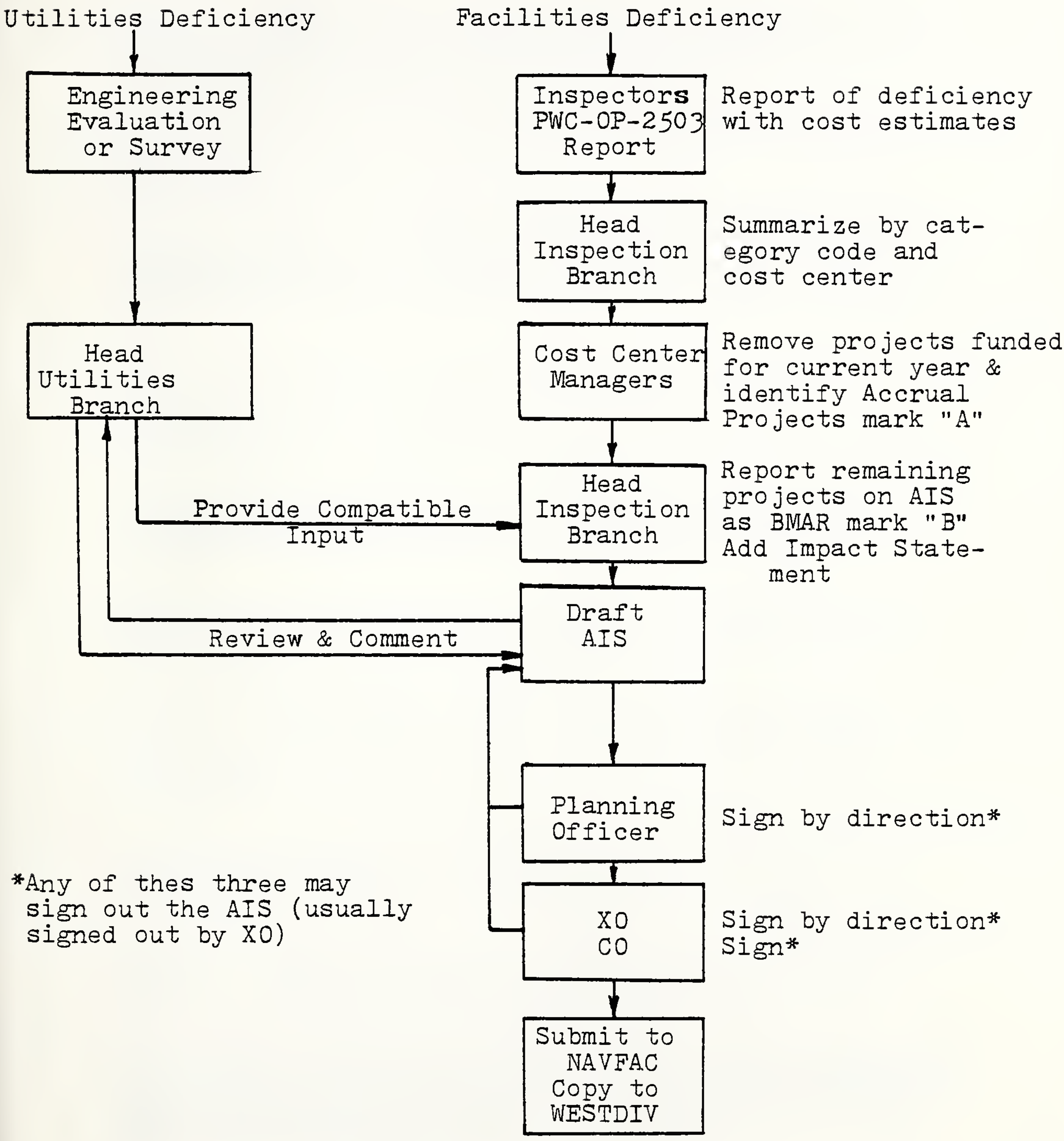


Figure 4

PWC SAN DIEGO AIS REPORTING FLOW CHART



*Any of thes three may sign out the AIS (usually signed out by XO)

Figure 5

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8 SEP 88 32689
11 DEC 88 35070

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